OCTOBER 26, 1967 • VOL. 22 • NO. 6 • A SCHOLASTIC MAGAZINE

SENIOR SCIENCE

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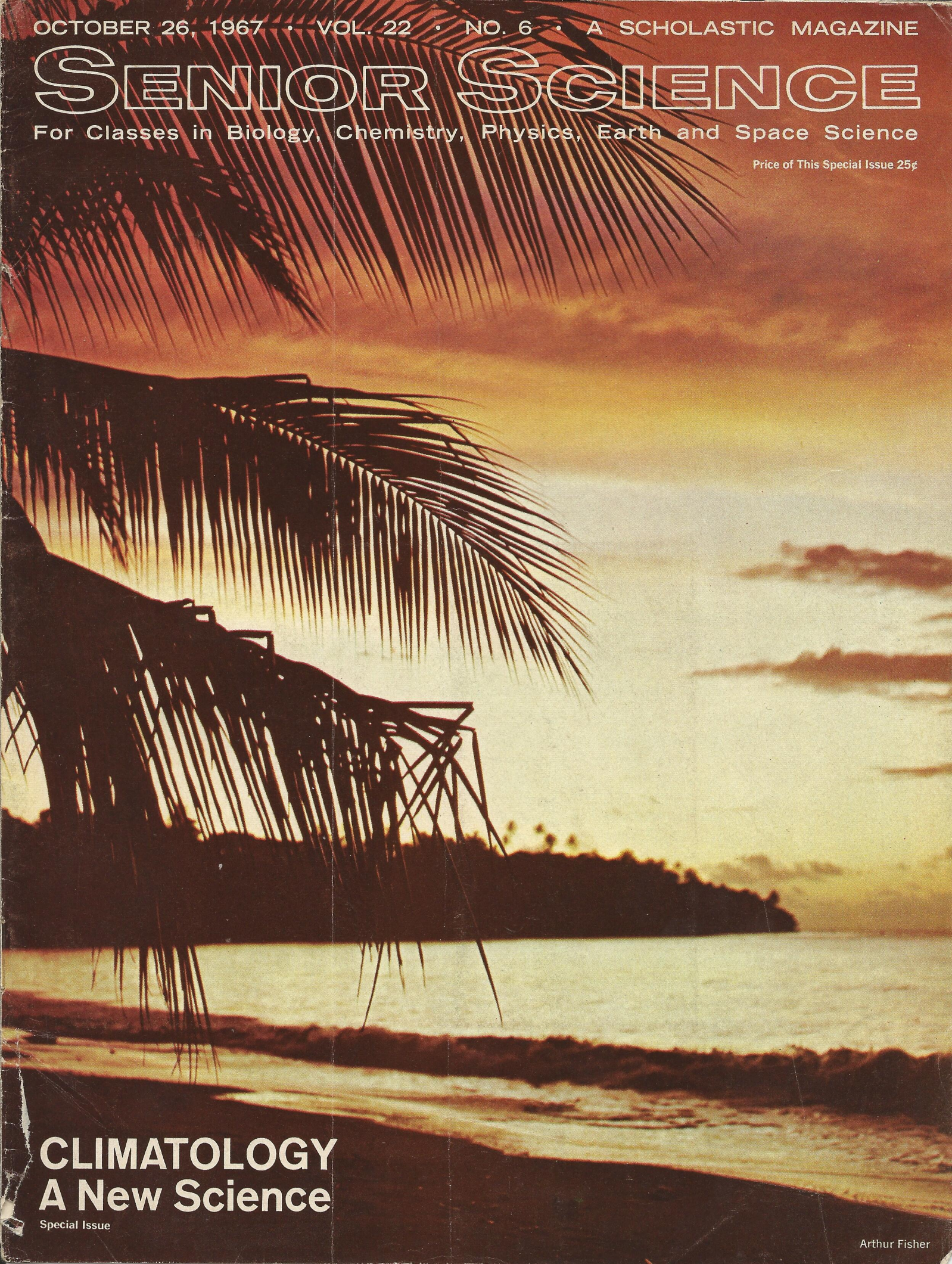

CLIMATOLOGY
A New Science

Special Issue

Arthur Fisher

Our campus study dates became steady dates

after I boned up on Angel Face Medicated Make-Up

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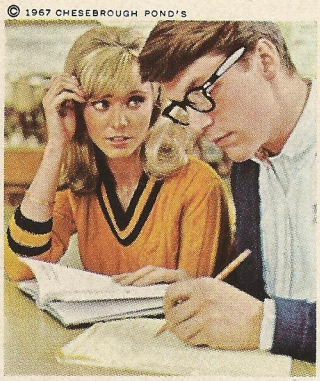

Our third date! But Pete and I never go anywhere but the library! It's time for the bookworm to turn . . . but I don't know how!

I feel so sure using Angel Face Medicated Make-up—all 3 kinds, Liquid, Cream and Compact. I never worry about Angel Face making *more* of any blemish problem I already have. That's because special medicated ingredients actually help keep bacteria under control—help prevent future blemishes from popping out.

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I made it! Pete finally said, "I'd rather learn about you than the Norman Conquest." So we turned in our books and headed for the track meet. Even in broad daylight, my skin looked spotless. Blessings on you, Angel Face!

Here we are at the fraternity party. It's my favorite snapshot of us. Because right after it, Pete asked me to wear his pin. Angel Face Medicated really turned a new leaf on my complexion—maybe even my life.

Fashions by Loomtogs, Inc.

We're looking for young people who love to draw...and who may have art talent worth developing'

says a group of America's most distinguished illustrators, painters, and cartoonists

Do you love to sketch landscapes... friends...animals...fashions...designs? It might not mean anything. But it *could* mean that you have natural art talent worth developing.

Now a group of America's most successful illustrators, painters, and cartoonists are interested in finding out. And if you *do* have talent, we want to help you develop it—without taking you away from home or interfering with your school work.

For two decades our Famous Artists School has been training thousands of talented *adults* all over the U.S. and in 56 foreign countries for successful careers in art.

Until now, we usually required our home-study students to be at least 16 years old. But we found that our youngest students often did exceptionally well. For example...take Paul Brewer. Ever since he was nine years old, Paul has been interested in art. As he grew older, his drawings showed real promise, as indicated by the drawing above. But not until he enrolled in Famous Artists School was he able to develop the professional skill shown in his drawing at the right.

"Without your training," he writes, "I would not have my present job as illustrator with the Chicago *Sun-Times*."

We concluded that if you have art talent, it pays to start developing it while you are still *young*. So we have created, for the first time, an art course for young people 12 to 16.

Imagine the privilege of being shown the lifelong trade secrets of thirty-five of America's most successful illustrators, painters, and cartoonists....

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Fred Ludekens	Fletcher Martin	Willard Mullin
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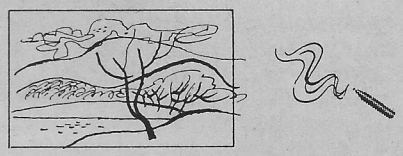
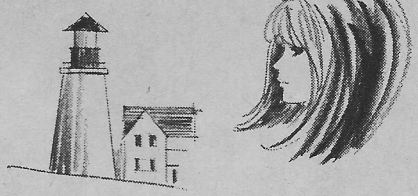
Bob Peak	Syd Solomon	Barney Tobey

Now talented young people everywhere may study the special techniques and "trade secrets" these outstanding artists took years to develop. You and your work get many hours of personal attention from the School's instructors. All are themselves working professional artists closely supervised by the Guiding Faculty. They redraw or paint parts of your work that need correcting...and write you long letters of friendly, encouraging professional advice.

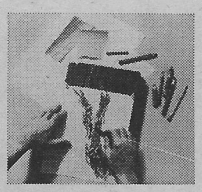


Graceful, curving pen lines are used for a peaceful scene of trees and rolling hills.

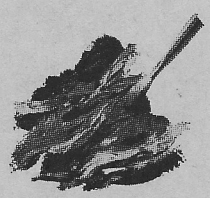
Sharp, bold, jagged lines with the same pen create a more wild and rugged landscape.



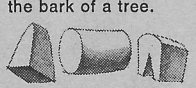
Simple pencil strokes can have a rich variety of uses, from the shading on a building to a girl's hair.

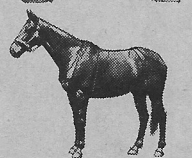


Rubbing with pencil on paper laid over grained wood can create a stormy sky or the bark of a tree.

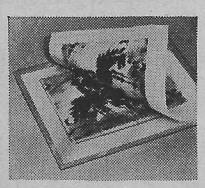


There's a special trick to blending different oil colors while they are still wet without having them blend into a muddy brown.





Drawing an animal like a horse becomes much simpler once you see the basic forms that go into it.

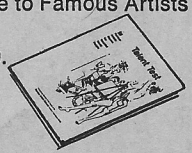


You can print "one of a kind" posters or greeting cards with nothing more than paint and a piece of glass.

For those who qualify for this exciting training program, the benefits can be great. New respect and recognition from your teachers, classmates and family. The possibility of earning extra pocket money with your art work. A wonderful feeling of confidence and achievement. And a real head start toward a full-time art career if you decide that's what you want.

Of course not every young person has the natural talent needed to benefit from this priceless training. To find out if you are one of the fortunate few who do, we have developed a unique *Young People's Art Talent Test.* If you are sincerely interested, it will be sent to you free, and graded free by a member of our staff.

If you do well, you will be eligible to enroll—though of course there is no obligation to do so. To receive the Test, and an illustrated booklet about the Course, just mail the attached postage-paid card. (If card is missing write to Famous Artists School, Studio 5645, Westport, Conn. 06880. Give your name, address and age, and ask for the Young People's Art Talent Test.)



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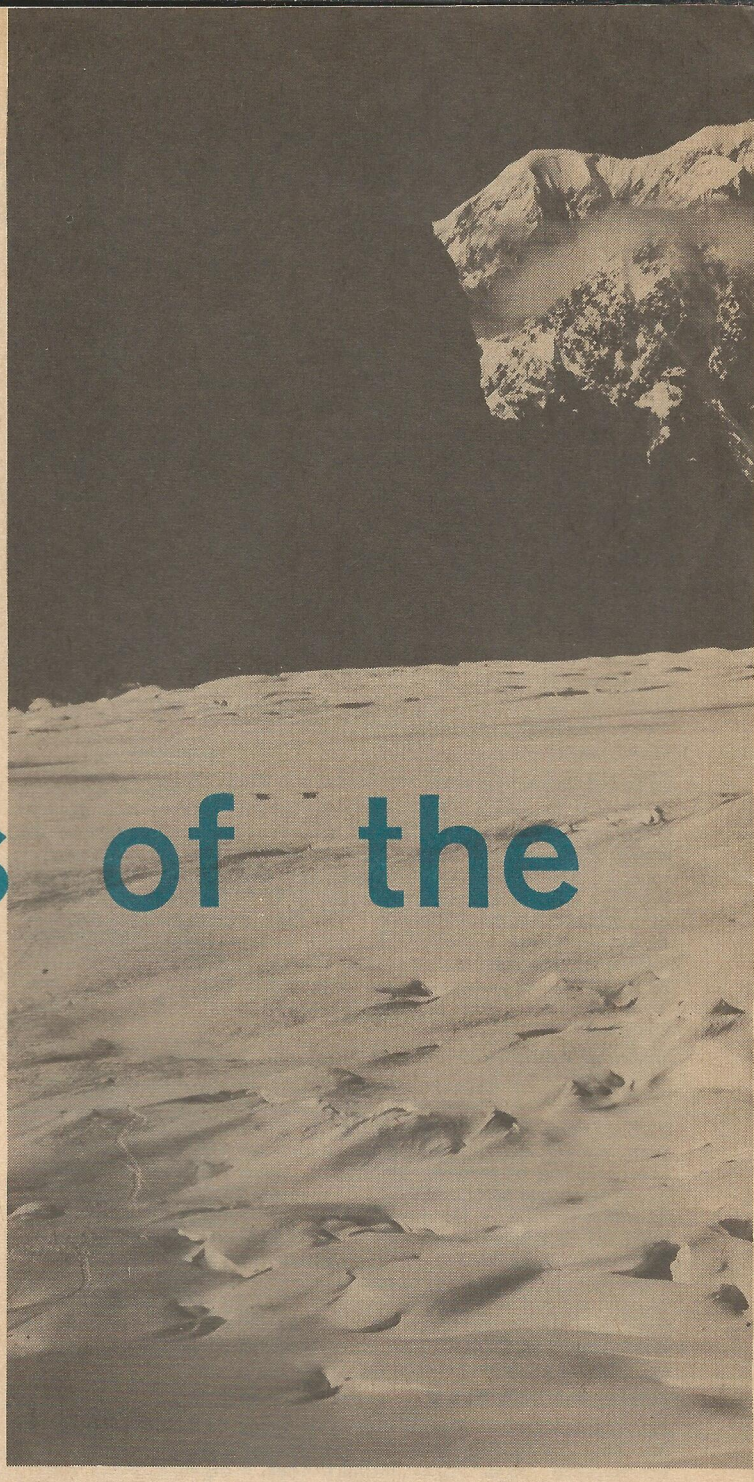
Cover photo: Arthur Fisher

Our Front Cover

The balmy, palm-fringed isles of the South Seas or the Caribbean — Jamaica on our cover — have always exerted a magic spell. Men in the drizzly highlands of Scotland or the scorching deserts of New South Wales heave vast sighs for tropic breezes. But few ask exactly why their climate is different. Or whether it has always been that way. Or what they can do about it. Do you know the answers? This special issue — entirely devoted to the emerging science of climatology — will give you some of them.

Drawing by Ted Blake



Coastal terraces, like those above, are clues to rate of falling sea level during Ice Ages. Ice Age glaciations made much of U.S. look like present-day view of Mt. McKinley, right.

Climates of the

THE seas rose, the Bible tells us, and animals filed onto Noah's ark two-by-two. But did you know that many civilizations, from Greece to Cambodia, have legends that also tell of a surge of world-wide floodwaters 6,000 or so years ago?

American geologist Rhodes W. Fairbridge is one of the science of climatology's hottest super sleuths. He felt there must be something to the world-wide "memory" of a deluge. Professor Fairbridge, a geologist at Columbia University in New York City, decided to research for evidence of changing sea levels in ages past.

First he considered comparatively recent information from tide gauges in world ports. It showed that the sea has been rising gradually in recent centuries. Tide-gauge evidence discloses that ocean levels at present are climbing at a moderate rate of about four and one-half inches per century. That certainly won't make for a world-wide deluge.

But Dr. Fairbridge wondered: Is it possible the seas might have surged upward more rapidly in ancient times?

Obviously, tide-gauge records don't go back 6,000 years or more. (The oldest records date from the late Middle Ages.) But Dr. Fairbridge points out that, when the sea level changes, it leaves its mark on the shore. How? If the sea drops, shorelines are left high and dry in a series of *coastal terraces*. But when seas rise, they submerge ancient shores, creating *drowned beaches*.

Both types of ancient beach contain fossil corals, bivalves, and other forms of life that once thrived along the coast. These fossils can be dated, and are clues to the age of a beach. Thus evidence from drowned beaches and coastal terraces tells how fast sea level rose or fell in different epochs.

Dr. Fairbridge believes the evidence shows that, about 17,000 years ago, world-wide sea level was some 330 feet lower than it is today! How come? Much of the planet's "water budget" was still tied up in the last of the glacial ice sheets of the Pleistocene Ice Age. As the glaciers melted, water trapped in the ice sheets flowed into the sea, thus raising sea level. The process still continues, and accounts for the gradual rise of sea level even today.

Next, Dr. Fairbridge draws on findings provided by oceanographers. They have discovered, by dredging submerged shores and by drilling into the ocean bottom, that the seas didn't rise smoothly. There were apparently

Bradford Washburn photo

periods when the seas surged upward at rates greater than 30 feet per century. Have you guessed when? The swiftest upsurge seems to have hit a peak some 6,000 years ago – the approximate time of the legendary deluge!

Dr. Fairbridge reminds us that most early civilizations were situated on coasts or beside great rivers that emptied into the sea. Thus, any rapid rise of sea level, especially if combined with a stretch of heavy rainfall, might have submerged many an ancient city. But, contrary to legend, he says, the seas never receded. In fact, according to geologic evidence, sea level has stayed almost constant ever since. There have been only minor fluctuations, such as the present slight upward trend.

An army of climate sleuths is on the trail of yet another great climatological mystery of the past – perhaps the greatest of all: the Ice Ages.

Scientists possess abundant evidence that this world was once a far warmer place than it is today (current average world temperature: 57.35°F). Fossil evidence shows that warm-water organisms, such as corals, thrived in ancient oceans that have become too cold for them in modern times. Coal deposits have been unearthed in Antarctica, proof that a verdant tropical forest once grew where winter ice now reigns supreme. And how about the dinosaurs that roamed the Earth until about 65 million years ago? These great reptiles required a subtropical climate like that in which alligators and crocodiles flourish today. Scientists think the

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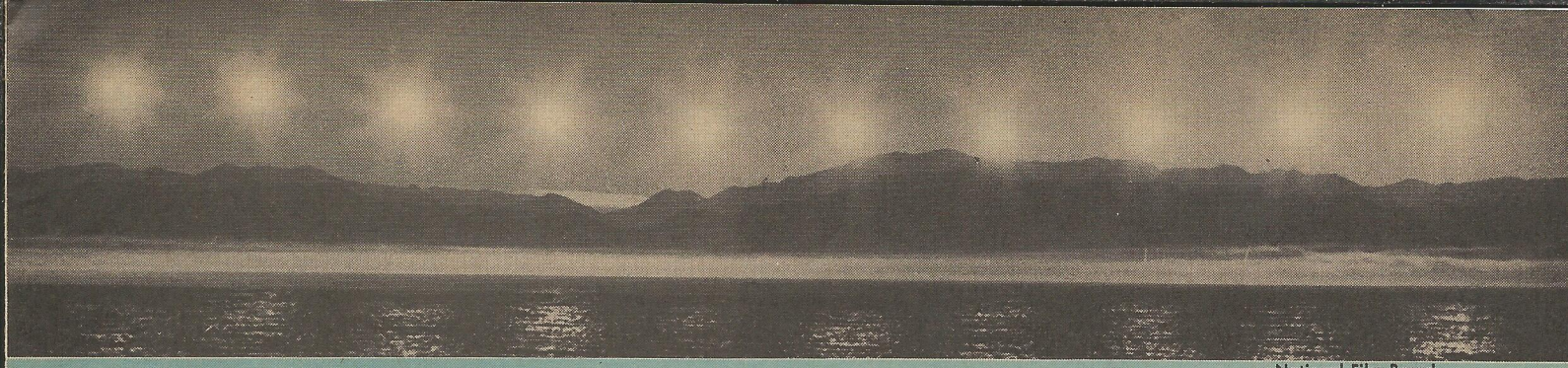

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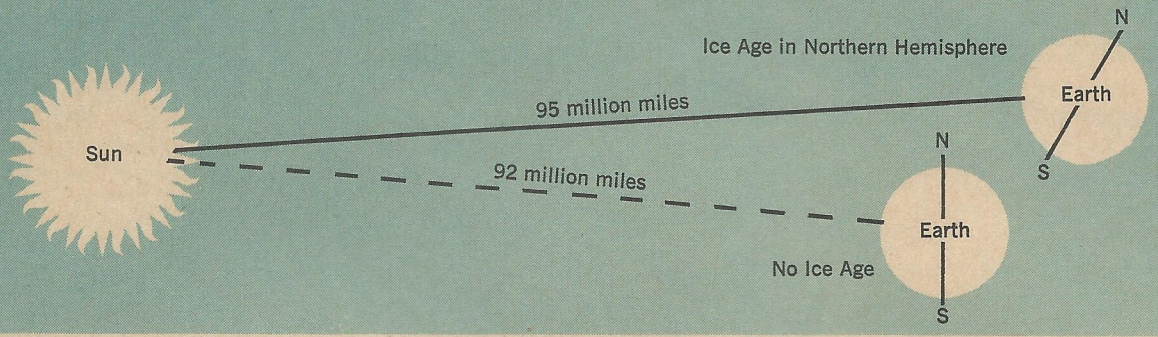
In this multiple exposure photo made at Baffin Island, the arctic summer sun never sinks below the horizon. This is because the North Pole presently tilts toward the sun during summer in Northern Hemisphere. Changes in Earth's axial tilt and periodic movement around sun do occur. One theory holds these changes may cause Ice Ages, as shown in diagram below.



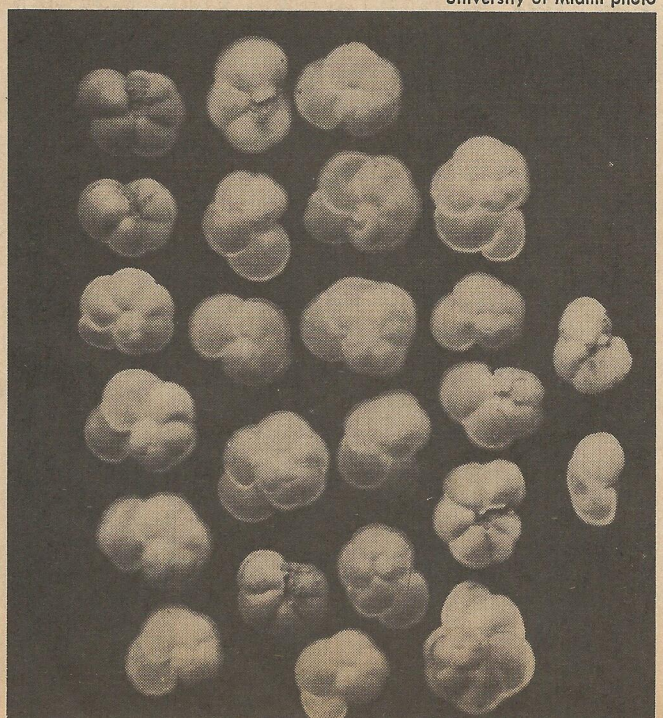
temperature-influencing volcanic smoke and carbon dioxide gas in the atmosphere. Still others point to apparent shifts in the geographic poles, or the slow wandering of continents across the globe over hundreds of millions of years.

Geological evidence shows that the Earth's long warm cycles are interrupted by glacier formation about every 200 million years. This mathematical regularity leads many researchers to favor the theory of Yugoslav astrophysicist Milutin Milankovitch.

Milankovitch based his theory on eccentricities *(irregularities)* in the periodic movement of the Earth around the sun. What are these eccentricities?

Foraminifera are sea-dwelling, single-celled animals. Chemistry of their shells tells water temperature in which they grew.

University of Miami photo



First: Astronomers know the Earth "wobbles" slightly on its axis as it orbits the sun. The "wobble" causes shifts in the timing and latitudes of the *solstices* — the farthest northward and southward movements of the sun in the sky. The solstices, of course, are the basis of the seasons in the Northern and Southern Hemispheres. The "wobble" cycle is completed every 26,000 years.

Second: Scientists know that the orbit of the Earth around the sun is slightly tilted. Moreover, the amount of tilt varies by some three degrees every 40,000 years.

Third: At present, the Earth's orbit brings it closer to the sun in December than in June, by several million miles. This causes Northern-Hemisphere winters to be about a week shorter than those of the Southern Hemisphere, and milder. Our summers are about a week longer, and a trifle cooler.

Now, according to the Milankovitch theory, an Ice Age occurs in either hemisphere when *all three* of these orbital eccentricities coincide in such a way as to produce the appropriate cooling down of climate. Calculations show that such periods do occur approximately at the same intervals as Ice Ages.

Climate historians are seeking more evidence of the causes of Ice Ages. Even if the Milankovitch theory is essentially correct, they say, other factors also may influence the severity of the Ice Age.

Suppose, however, that the Earth is headed for a long warming cycle, rather than for ice? We had better be well prepared for this, too, say climate historians. One reason: The water locked up in the ice caps of the Arctic and Antarctic is enough to raise sea level more than 300 feet! If these ice sheets melt, man will have to take steps to protect much of civilization from another devastating, if far more gradual, repetition of the ancient deluge.

—JOHN SPEICHER

Photo by Arthur Fisher

THE TROPICS are hot and the poles are cold. In between, the climate changes gradually from one extreme to the other. Or does it? Look at a map of the world. Why does Iceland flourish while Greenland, right next door, goes virtually uninhabited? Why is Great Britain a leading industrial nation while Labrador, directly across the Atlantic, is a cold wasteland?

The answer, in two words, is *ocean currents*. The shores of Iceland and the British Isles are bathed by warm water carried north from the tropics in two currents: the Gulf Stream and its northern branch, the North Atlantic Current. The coasts of Greenland and Labrador, on the other hand, are washed by cold water moving down from the Arctic. This difference in water temperature creates totally different climates.

The Gulf Stream and the North Atlantic Current together resemble a giant, northeasterly-flowing "river" about 7,000 miles long. The "river" carries warm water as far as the coast of Norway and gives all of northeastern Europe a moderate climate. Average winter temperatures there, in fact, are 5° to 15°F higher than they would be without the ocean's warmth.

Why doesn't the water grow cold long before the end of its 7,000-mile journey? Because, during its stay in tropical seas, the water absorbs an enormous quantity of heat. And water is noted for its *high heat capacity:* The temperature of water rises very slowly as it absorbs heat, and falls very slowly when it loses heat. (Try warming an empty pan and a pan full of water to the same temperature, then letting them cool. The empty pan will cool off much faster.)

Equally important, the amount of water in ocean currents is enormous. The flow of water in the Gulf Stream through the Florida Straits, for example, is roughly the equivalent of a thousand Mississippi rivers. A rise in temperature of even one degree in that much water

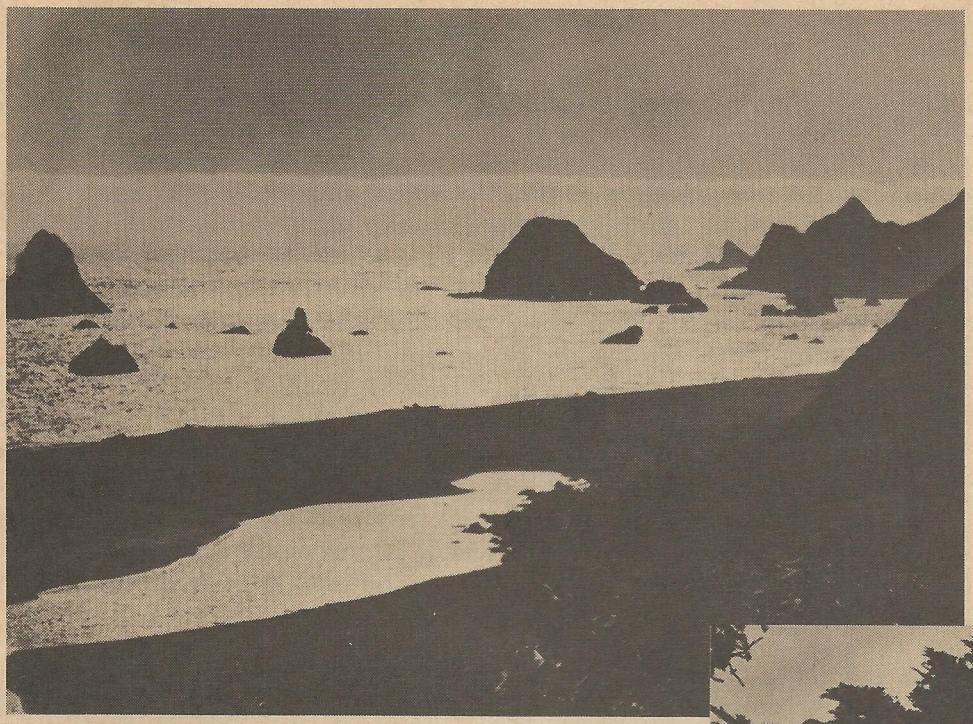


Photo by Arthur Fisher

British Travel Association

Although Scilly Islands (below) off England's south coast are many miles north of the bleak California coast (left), they are lush and semitropical. Why? They are warmed by Gulf Stream, whereas coast is cooled by California Current.

Currents and Climates

represents a fantastic amount of heat energy.

Other oceans also have warm currents. The Japan Current (or Kuroshio) flowing along the east coast of Japan gives much of that country a subtropical climate. The south coast of Alaska is warmed by the Alaska Current.

In the Southern Hemisphere, the Brazil Current flows southward from the tropics to bring a warm, moist climate to the east coast of South America. The southeast coast of Africa is warmed by the Mozambique Current. The climate of eastern Australia, too, is modified by the warm East Australian Current.

What makes these currents? Many causes are involved, but the basic cause is *wind*. Far out at sea, the winds blow steadily in the same direction day after day. In the middle latitudes (between 40 and 60 degrees) they blow eastward, or from the west, and are called *prevailing westerlies*. Near the Equator, however, the so-called *trade winds* blow mainly *toward* the west.

These winds, in both the Northern and Southern Hemispheres, stir the water beneath them. The resulting currents flow with the winds – eastward in the middle latitudes, and westward near the Equator. When the currents reach the margins of the oceans they are forced to turn aside. Generally, the middle-latitude currents turn toward the Equator, and the equatorial currents turn away from the Equator.

Then a major influence on the ocean currents comes into play – the Earth's *rotation*. The spinning of the Earth tends to make north- or south-flowing currents turn to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This tendency, known as the *Coriolis effect*, serves to establish an over-all rotational pattern of the currents in each ocean (see map, page 12). The direction of rotation

Continued on next page

Current and Climates *continued*

is clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere. The rotating current patterns are called *gyres*.

The warm currents that flow poleward from the tropics are all on the west sides of the oceans (see map this page). And the cool currents that flow toward the Equator from the poles are all on the east sides of the oceans. The cool currents are best developed in the Southern Hemisphere. Why? There are fewer land masses there to confine the oceanic gyres. In addition, a cold current known as the West Wind Drift completely surrounds the frigid continent of Antarctica. This current, driven eastward by the prevailing westerlies, is a "bottomless well" of cool water.

The West Wind Drift gives rise to three major cold-water currents that flow north toward the Equator. These are the West Australia Current, which cools Australia's west coast; the Benguela Current, which cools the southwest coast of Africa; the Humboldt (or Peru) Current, which cools the west coast of South America.

Plankton—First Link in a Food Chain

The Humboldt Current not only affects the climate, it virtually supports the economy of Peru. Why? Because the current is alive with tiny floating organisms called *plankton*. These plankton are the first link in a highly important *food chain*. They provide food for billions of small, sardine-like fishes known as anchovies. And the anchovies, in turn, nourish an enormous population of tuna, swordfish, and bonito – the basis of a thriving fishing industry. (Also, the anchovies themselves are caught by the boatload and made into fish meal for cattle and poultry.)

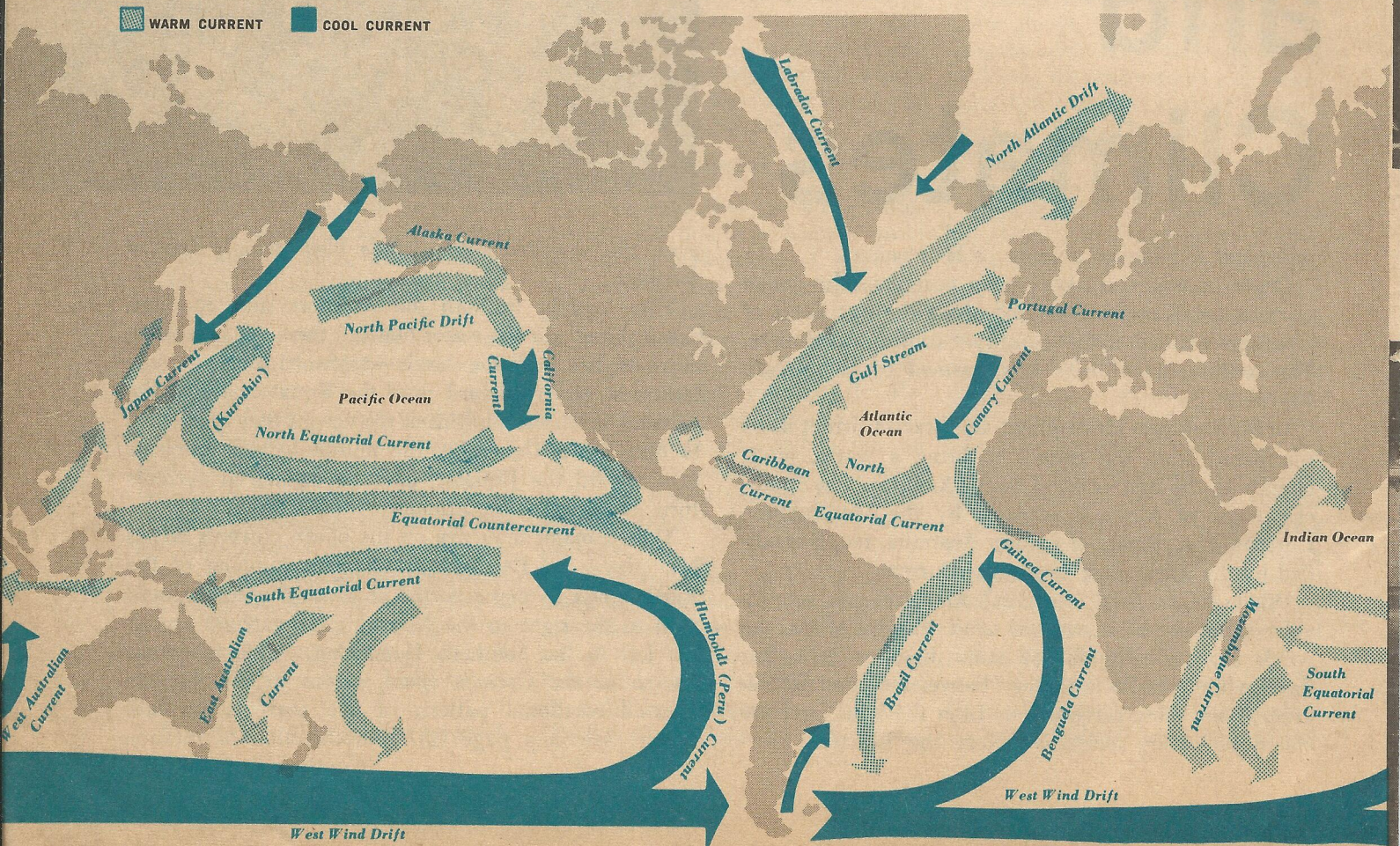
Even more important, the anchovies provide food for millions of sea birds, mainly cormorants and boobies. Peruvians consider cormorants and boobies the most valuable wild birds in the world. Why? Because their droppings, called *guano*, thickly encrust a string of islands off the southwest coast of Peru – and guano is the finest natural fertilizer known.

Each year the birds eat millions of tons of anchovies, and each year thousands of tons of guano are gathered from the offshore islands, where the birds nest. All of the guano is used by Peruvian farmers. Agriculture supports over half the workers in Peru, and most of the cropland is fertilized with guano.

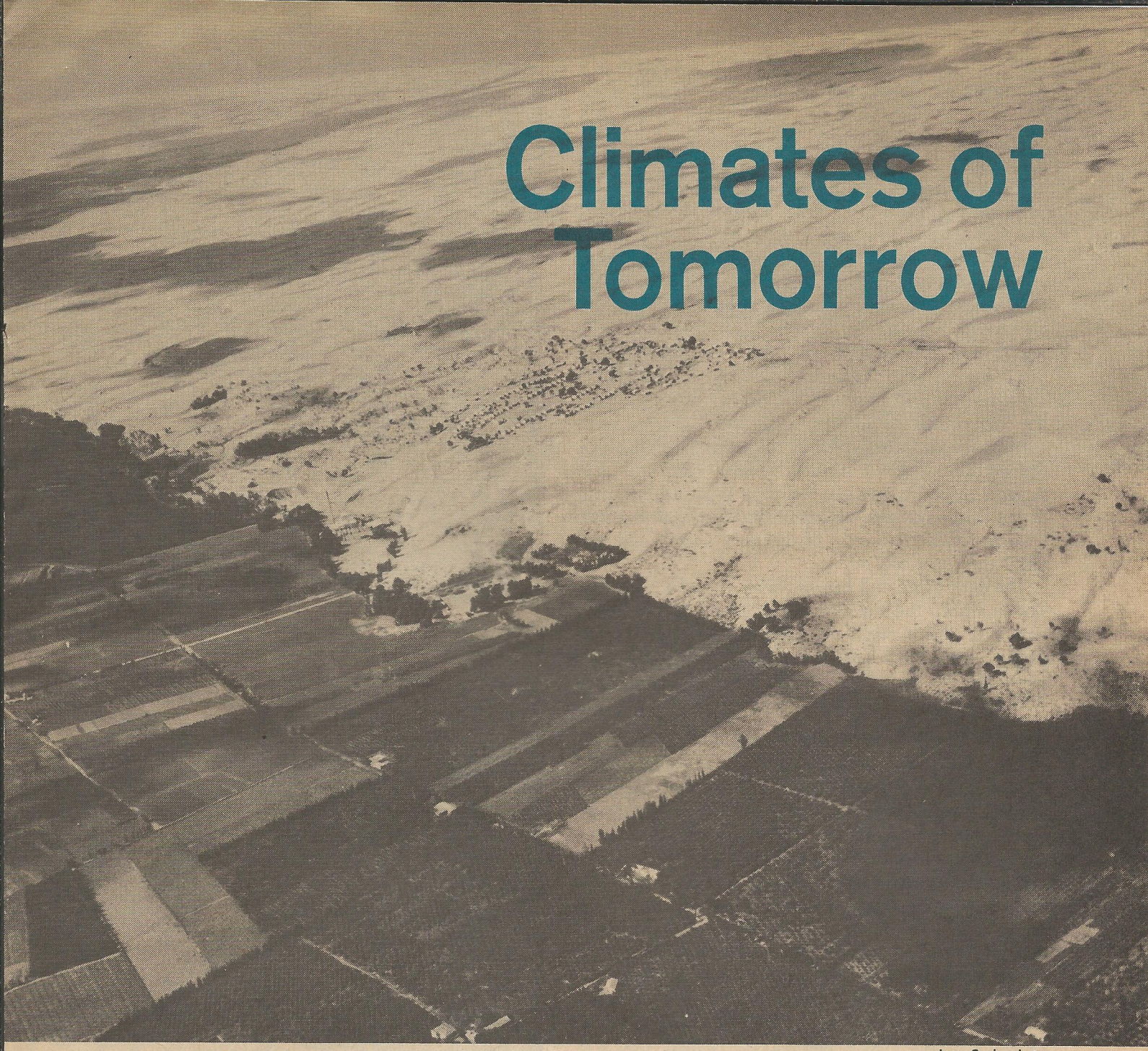
Thus the important food-fish and fish-meal industries, as well as agriculture – the backbone of Peru's economy – all depend on the cold Humboldt Current for their existence. Warm or cold, ocean currents drastically affect the lives of people throughout the world.

— Donald Sanders

Ocean currents form circular patterns—gyres—in each of the oceans. They flow clockwise in Northern Hemisphere and counterclockwise in Southern, because of Earth's eastward rotation. Warm and cold currents are major influence on climate.
Senior Science graphic



Climates of Tomorrow



Jerry Cooke photo

CAN man change the climate? Of course: He's been doing it for thousands of years. And most of the changes have been bad.

Man didn't set out to change the climate. Until recently, he didn't even know that he was doing it. But each time trees were felled, fields ploughed, cities built, the climate changed slightly. And all of these changes have continued, increased, and interacted over the centuries.

Why does climate change when land is cleared? Because plants are removed. Just as climate influences plant growth, plants influence climate. They have a steadying effect on climate, particularly in the Earth's drier regions.

Trees, grass, and moss keep the soil moist by trapping rain water. And they shield the ground from the harsh effects of sun, wind, and frost. Because water heats slowly and cools slowly, the temperature of the moist sheltered soil remains fairly constant from night to day and from winter to summer. Since the air above exchanges heat with the plants and soil below, air temperature also remains fairly constant. The soil and plants cool and moisten the air in the daytime and warm it at night.

What happens when trees are chopped down? In regions with little cloud cover and low rainfall, the

Above: Israeli scientists make deserts bloom by irrigating them. Result: Area's climate is changing. Plants cool and moisten the air in the daytime, warm it at night.

results are often disastrous – the surface of the soil dries out. Grazing animals and driving winds strip away dry grass. And rain, when it comes, does more harm than good.

Without trees or bushes to stop its flow, rain water washes over the sunbaked land, taking plants and topsoil with it. The result of many years of this is a desert with a desert's climate – hot when the sun shines and cold when it doesn't. In *temperate* (mild) climates, the results of land clearing are not so severe. Less sunlight reaches the ground, because of cloud cover, and rain is more frequent. Thus the same drying process would not take place.

Even the changing color of the land speeds climate change. Dark-colored surfaces absorb heat, and pale surfaces reflect it. You can feel this: Wear a black coat in sunlight and you will probably get quite warm. Change into a white coat of the same weight and material and you'll cool off.

The dark green and brown colors of plants and trees slowly absorb the sun's heat and pass it to the moist, dark soil. There much of it remains during the chill sunless hours. But when the trees and plants are cleared away, the dry surface of the soil takes on a new color – a pale dusty tan shade – a heat-reflecting color.

Reclaiming the Once-Fertile Crescent

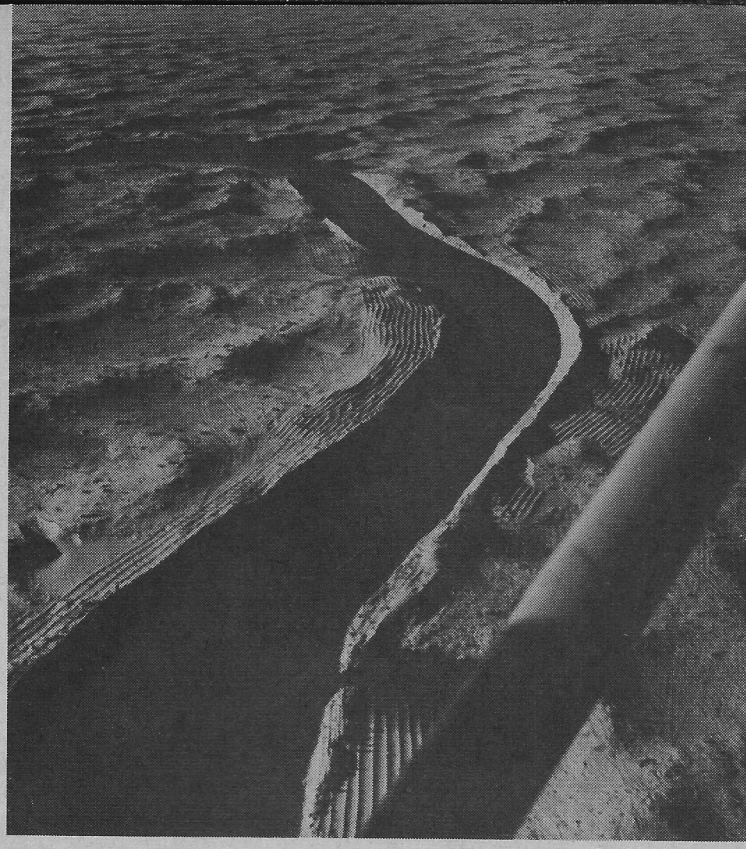
Thus, when the sun shines, the layer of air above the ground is heated in two ways – by the direct rays of the sun and by heat radiated from the ground. And, because hot air rises, this double heating can cause quite a commotion in the atmosphere.

During daylight hours, masses of hot air rise up from the desert, taking dust and sand with them. As these hot dry air masses rise, cool, and spread out, they push around the air masses already there.

This has happened many times, and in many parts of the world. In Biblical times, the lands near the eastern Mediterranean (now the countries of Turkey, Syria, Lebanon, Israel, Jordan, and Egypt) formed what was known as the Fertile Crescent. Although rain didn't come often, the area was rich in plant life and the climate was warmly temperate and pleasant. Now, much of the same region is desert or semi-desert, with temperatures ranging from chilling cold to extreme heat. What went wrong?

The ancient inhabitants of the region cleared the land carefully – preserving and planting trees, digging drainage ditches, and building *cisterns* (underground tanks for storing rain water).

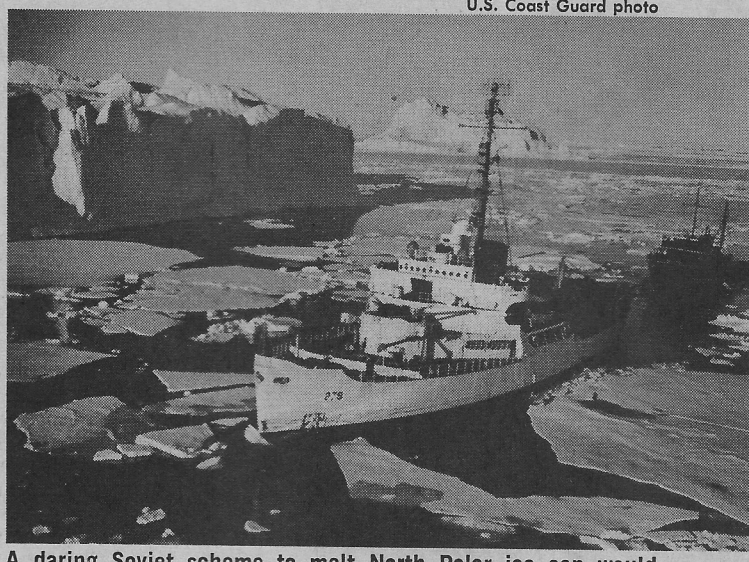
Then wars and invasions laid waste the land, moved its peoples around, and ended the careful farming. Trees were felled, cisterns broken, ditches filled, and wandering sheep and goats ate most of the smaller plants. This upset the delicate balance between soil, plants, and climate, and started the drying-out process. As the land dried, the climate grew harsher and speeded up the drying.



Sovfoto

Soviet engineers are building 898-mile-long canal to water desolate Kara Kum Desert and make it fertile.

U.S. Coast Guard photo



A daring Soviet scheme to melt North Polar ice cap would make Arctic Ocean scenes like this a thing of the past.

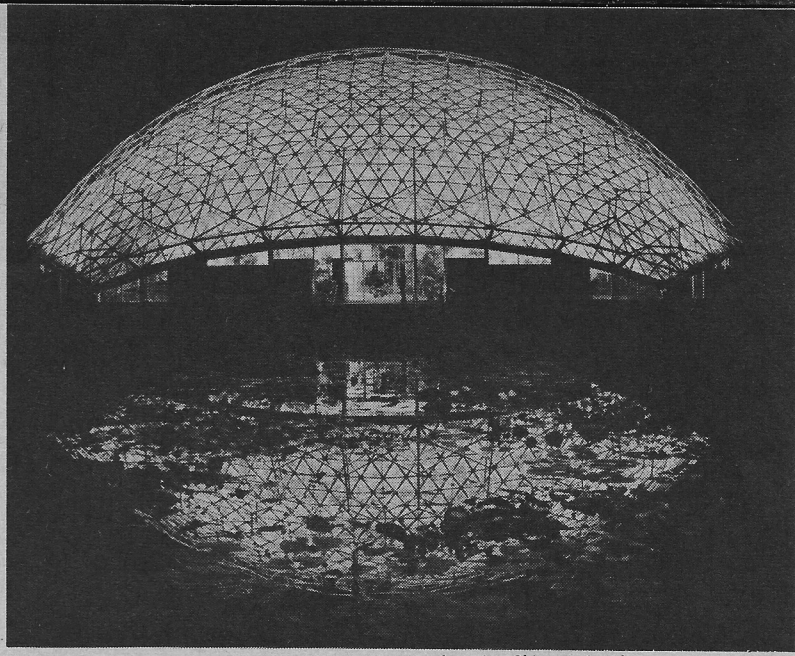
If man can have such a bad influence on climate, surely he can also have a good influence on it. Can't the process be reversed? The answer is a resounding "Yes."

Israeli scientists and farmers have made deserts bloom again. By piping water over great distances, by digging deep wells, by anchoring sand with black oily substances, and by planting hardy trees and plants to shade the soil, they are putting fertility back into the Fertile Crescent.

Deserts in other countries are also being *reclaimed* (made useful). Great stores of ancient water in rock formations beneath the Sahara Desert (even the Sahara was once rich in plant life) are being tapped. They

Olin photo

These plants are being grown under completely artificial climatic conditions at the Squibb Institute for Medical Research.



Lemoine Skinner, Jr. photo

Influence of climate on plant growth and of plants on climate can be studied in Climatron at Missouri Botanical Garden.

are being used to make parts of the desert fertile in Egypt's *New Valley Project.*

Soviet engineers are digging an 898-mile-long canal from the Amu Darya River to the Caspian sea. No ships will sail on this canal — its purpose is to provide water to make the vast Kara Kum Desert fertile again.

None of these projects was deliberately planned to change the climate. But they are changing it, and for the better.

Residents of the town of Broken Hill, in central Australia, like their climate much better since plants and trees were planted in and around the town. No longer are their summer days scorching hot, with frequent dust storms. (In this case, climate improvement was a deliberate goal.)

As deserts are made fertile, local climates will become more temperate and stable. And the benefits may be felt far from the former deserts.

Climate "Tampering"

However, while the damages of the past are being repaired, present human activities may be causing new damage. Professor Reid A. Bryson, of the University of Wisconsin, points out that we are creating city climates with more fog and rain, and less sunlight, than surround the nearby countryside. Smoke from industry and dust from traffic provide *condensation nuclei.* These are the small particles around which water vapor condenses to produce fog, mist, and rain. According to Dr. Bryson, dust domes have formed around our cities and are blocking out a third of the normal sunlight.

Dr. Walter Orr Roberts, Director of the National Center for Atmospheric Research, is also deeply concerned about the effects of dust, dirt, and smoke on our atmosphere. But he urges caution on scientists who wish to change climate. He feels that the atmosphere is so complex that years of research are needed to understand what goes on, before any major attempts should be made to change climate.

Soviet scientists — eager to develop frozen lands in Siberia — are less cautious. At present, they are scattering clouds to raise daytime temperatures in certain areas by several degrees. And they are protecting crops from hail by preventing the formation of large hailstones. Huge glass roofs are being designed for some of their new arctic cities, to let in the sunlight and keep out the driving snow and cold.

However, these projects are small fry compared to some other Russian schemes. Professor E. K. Federov, of the Leningrad Institute for Experimental Meteorology, suggests that the North Polar Ice Cap should be melted. If there were no ice up there to keep the water cold, the Arctic Ocean might warm up. Can you guess what the danger might be in such a plan?

Professor Federov also suggests that a dam be built across the Bering Straits to block cold ocean currents from sweeping down upon the Siberian coast. A Soviet engineer, V. Cherenkov, believes we should aim at a larger target — the Earth itself. He would like to shoot a billion pounds of dust into orbit around the Earth. This, he claims, would trap heat in our atmosphere and would warm up the entire planet.

How do most scientists in other countries greet these ideas? With worried frowns! Feeling that we have enough man-made problems, they fear the dangers of any large-scale tinkering with the climate.

Some scientists even question the wisdom of such local weather modification as rain making, fog dispersal, and hurricane taming. They feel that, in the long run, the climate might be changed for the worse.

For example, rain is made by *seeding* (sprinkling) large clouds with dry ice or silver iodide crystals. But, as a University of Chicago scientist has pointed out, rain produced for one area might reduce rainfall in nearby areas. And who is to say when rain is needed? Rain to benefit a farmer in one locality might "wash out" all the plantings of a farmer in another county.

Should man control climate? What do you think?

—Michael Cusack

SCIENCE IN THE NEWS

Moon Part of Earth?

A new picture of the moon is coming into focus. Its surface is believed to be made of rock that was thrown up by volcanoes. It is similar to volcanic surfaces on Earth. And the moon was once hot with volcanic activity – and probably still is.

These findings contradict the popular idea of the moon as a cold, dead celestial body that is older than Earth. They result from the findings of the Surveyor 5 spacecraft which landed on the moon's Sea of Tranquillity last month. In addition to transmitting 18,006 photographs before the lunar night darkened the lenses of its cameras, the spacecraft analyzed the moon's soil.

Scientists say that the surface of the moon is of volcanic origin. It is of a basaltic type like that which comes from beneath the crust of the Earth. On Earth, this soil is thrown to the surface when a volcano erupts. Such soil is found in areas ranging from Iceland to the Hawaiian Islands, to India.

Dr. Harold Masursky of the U.S. Geological Survey said that the vast waterless seas of the moon were formed by meteorites. He thinks that all of these moon "sea" surfaces, or 20 per cent of the entire moon's surface, are similar to the volcanic rock on the Earth.

Dr. Anthony Turkevich, who directed the soil-analyzing experiments, said that the two most common elements on the moon's surface are oxygen and silicon. They are found in the same ratio that exists on the Earth's surface.

Dr. Eugene Shoemaker of the U.S. Geological Survey said that the new moon soil analysis supports the idea that the moon was a chunk torn from the Earth millions of years ago.

Nitrogen in Tires

It's easy enough to get air for tires. Or is it? The auto industry is moving back to the idea of putting nitrogen in car tires. This was the practice 12 years ago with racing cars.

Gulf Oil Corporation is experimenting with the idea of selling nitrogen in all tires. It says that tires inflated with nitrogen last 25 per cent longer on passenger cars; truck tires get 50 per cent more wear when they are filled with pure nitrogen.

Tire manufacturers do not agree completely with the idea of going back to nitrogen. One representative of a tire company said, "We started investigating this 12 years ago when tubeless tires were first emerging. We finally decided our objective would be to build a tire that would last as long using air as one using nitrogen. This we accomplished. Today there would be no great advantage in using nitrogen."

Why nitrogen, anyway? Nitrogen is less reactive than oxygen, which makes up about 20 per cent of our air.

If nitrogen is used for car tires, it will cost car owners $1 a tireful. And it will cost about $12 to flush the oxygen fully from the four tires on a car.

But the upkeep of nitrogen for car tires would be inexpensive. The car owner would have to add only a little nitrogen – a 20-cent squirt to keep the tires inflated.

Nitrogen storage equipment and supplies would add to the cost of manufacturing cars. The auto industry likes to go slow in raising car prices, so it will take some time before nitrogen drives out air in tires.

Project Gasbuggy

Project Gasbuggy will blast into action this month. In a remote area of New Mexico, a nuclear bomb equal to 26,000 tons of TNT will be exploded – 4,240 feet below ground.

Why? Scientists want to see whether nuclear energy can release natural gas from rocks with a low gas content.

A successful underground explosion on the first try will mean drastic changes in the entire gas and petroleum industry. It will also bring about changes in engineering techniques, where economical new methods of powerful blasting are needed.

In Farmington, N.M., the representatives of 15 countries met recently to find out how Project Gasbuggy is progressing. They included persons from such fields as insurance, railroads, aircraft manufacturing, and even teaching.

Scientists warned the delegates of one disadvantage of nuclear mining. The natural gas released by the explosion will be contaminated with tritium (the gas resulting from the explosion itself). If large quantities of natural gas are set loose by the explosion, they will have to be diluted with pure natural gas, said Dr. Floyd F. Momyer of the Lawrence Radiation Laboratory in Calif.

Dr. Momyer said that the radioactive tritium would be present wherever a nuclear explosion was set off.

Weathermen are predicting that the weather will be clear, with the light winds needed for the project. And, unless blizzard conditions unexpectedly break, 200 persons from U.S. government and industry will be on hand November 14. They call it D-Day for Project Gasbuggy.

Man Races Shadow

The fleeting shadow of the moon will be tracked by the world's fastest

Photos from Boeing

airplane during a solar eclipse in 1970.

Scientists think they will be able to photograph the eclipse phenomenon for more than an hour with the aid of the fast-flying plane. On Earth, observers see an eclipse of the sun for seconds only, or at the most, minutes.

Dr. Harold Glaser, chief of solar physics for the National Aeronautics and Space Administration, says that scientists want to learn more about the lowest layer of the sun's atmosphere. This area, called the *chromosphere*, can be seen only during a solar eclipse.

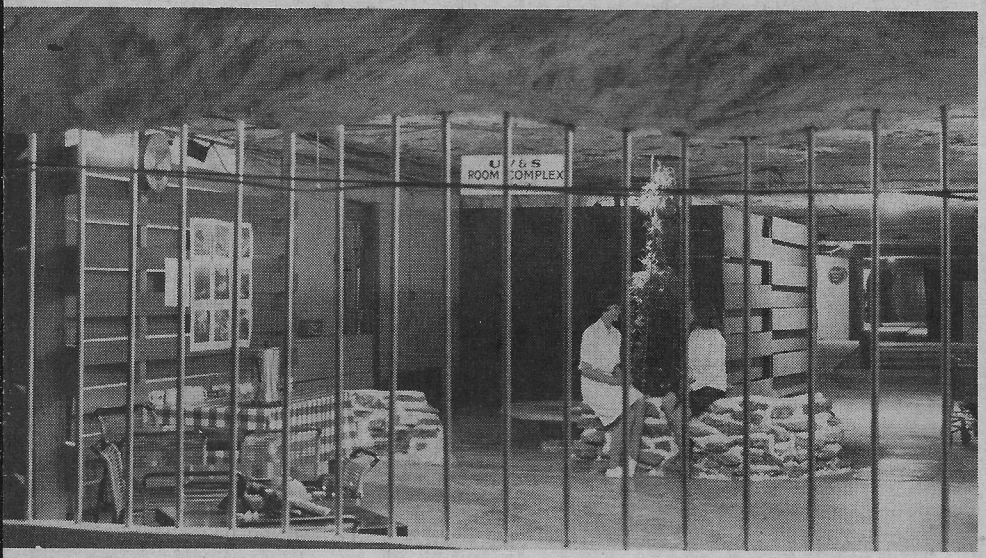
During an eclipse, the moon moves like a giant disk between the sun and the Earth. It shuts out the brilliance of the glowing sun center. Thus the outer layers of the sun, near the surface, can be photographed. Scientists have instruments that blot out the brightest part of the sun, making the corona visible at any time. But this equipment also blots out the lowest level of the chromosphere. The only time this area can be observed is during a solar eclipse.

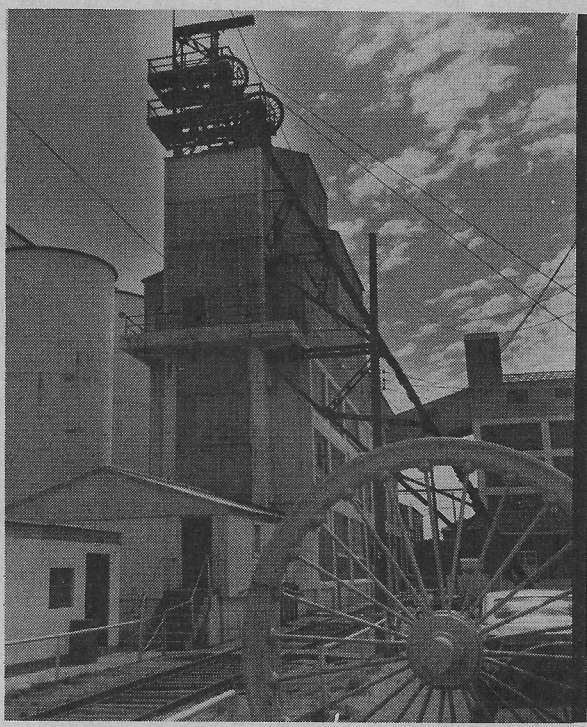
The plane that may be assigned to study the sun's chromosphere in 1970 is the Lockheed YF-12A, an advanced model of the "spy plane," the U-2. The YF-12A holds nine world speed and altitude records.

It can travel at an altitude of 80,000 feet – above the distorting effect of the Earth's atmosphere. The plane can follow the moon's shadow at a speed of 2,000 miles per hour. The lunar shadow moves along the Earth's surface at speeds of 1,500 miles per hour or more.

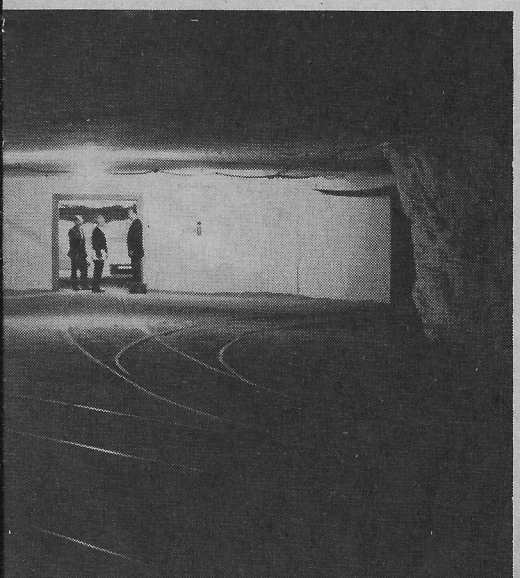
During the 1970 eclipse, the moon's shadow will move on the Earth's surface almost in a straight line from Jacksonville, Fla., to Halifax, N.S. This route will simplify servicing of the plane and its instruments. The plane will carry several hundred pounds of equipment. Included will be special spectrographic cameras, which photograph the sun's rays broken into their various wavelengths. The length of the light waves is determined by the chemical composition of the substances that emit the light.

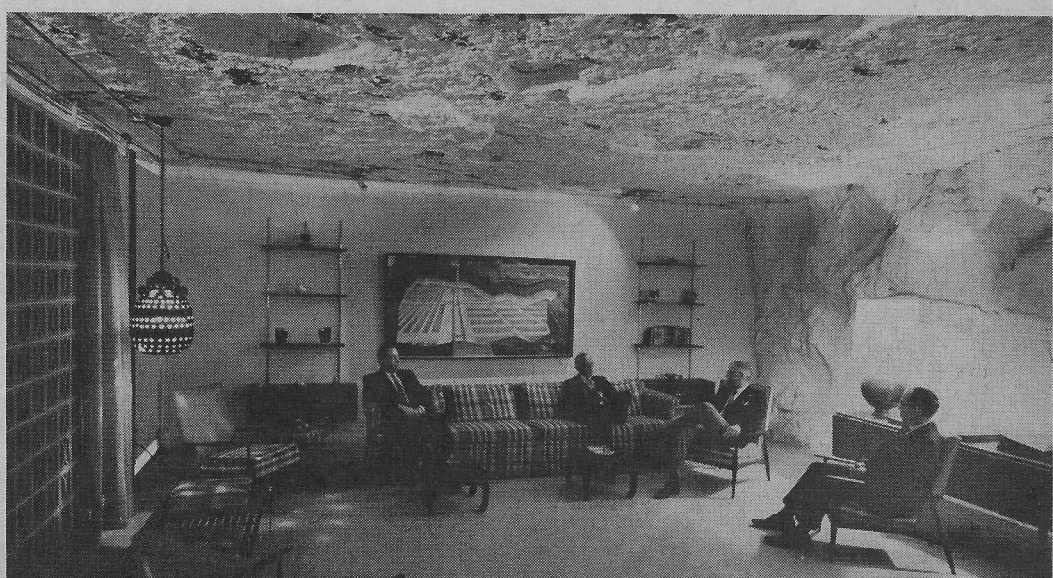
Slower planes that traveled at lower altitudes have already chased solar eclipses. These planes could not stay with the shadow long enough for any practical advantage in using them. Scientists think that the YF-12A can do a better job. A full-fledged eclipse program will probably be announced soon for 1970.





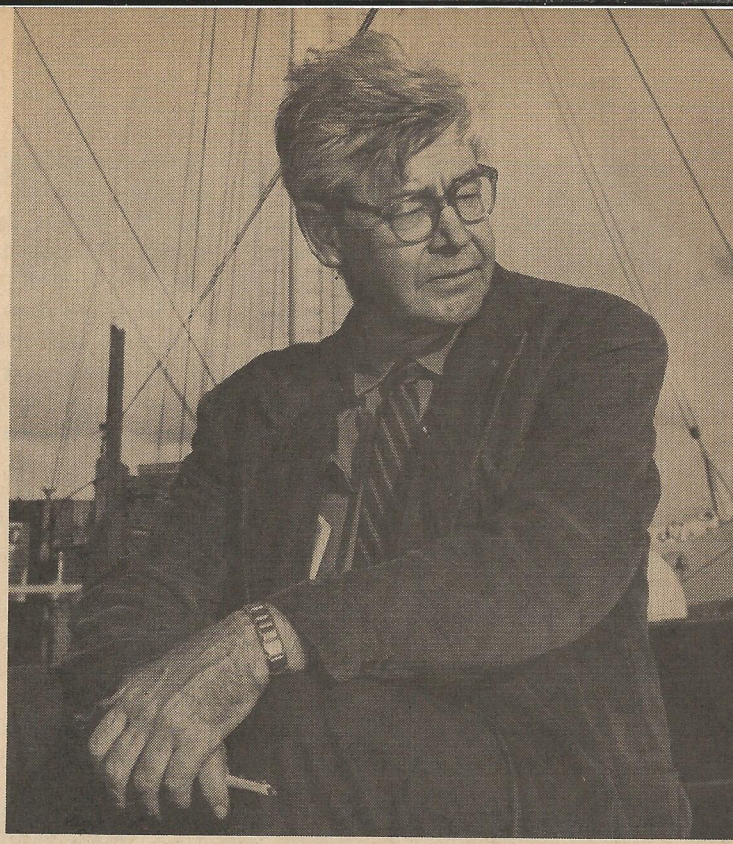
Where once salt was mined, vital government and industry records, oil paintings, and even films like "My Fair Lady" are cached away. For more than five years, 50 miles of corridors have been filled with important national memorabilia 650 feet below ground. Above: steel bars add security to the salt mine stash-away. Upper right: the entrance to the mine has been a land mark in Hutchinson, Kans., since 1920. Lower right: salt walls line a lounge room. These walls keep the mine temperature at an even 68 degrees F, and the humidity at 57 per cent—perfect storage conditions.





today's scientists

Dr. Maurice Ewing
He Sails the Seven Seas



"LASH down that gear!" Above the scream of a cold wind that howled across the seething Atlantic, the scientist's command sent the crew into action. A gale had exploded around the three-masted schooner *Vema*, ripping the gray waters into 30-foot waves. Five days out of New York City and bound for Bermuda, the 500-ton vessel was on the first leg of an expedition to explore the mysteries of the watery depths. But now the *Vema's* scientific equipment banged against the rail.

Shouting encouragement, the leader of the expedition – Dr. Maurice Ewing – groped along the slippery deck. Suddenly, two giant waves broke on either side of the *Vema*. Dr. Ewing was flung off his feet and spun toward the rail. Headlong, the scientist pitched into the sea.

At the same time, three other men were hurled overboard. Neither they nor Dr. Ewing wore life jackets. Desperately, the *Vema's* captain twisted the schooner's wheel, and he felt the small ship shudder as she hove to. Then, ordering the mate to hold the helm as steady as possible, the captain climbed up the foremast. From his swaying perch, the captain guided the rescue. Three of the men were snatched to safety; the fourth was lost. One of the three saved was Dr. Ewing, although he had suffered a severe brain concussion.

In a few hours, the gale lost its punch, and the *Vema* regained her course. In Bermuda, Dr. Ewing was put on a plane and flown to New York City, where he was hospitalized. Weeks later, fully recovered, the scientist returned to the *Vema* to finish the expedition. It was characteristic of Maurice Ewing to do just that. A colleague once remarked of him: "Of all the great scientists today, I know few who are more willing than Dr. Ewing to get their hands dirty with work." To his associates, the tall, white-haired Texan is known as a scientist who never takes a holiday.

A Scientist's Scientist

The whole Earth is Dr. Ewing's field of study. His title is professor of geology. Among oceanographers, however, he is considered an oceanographer. To geophysicists, he is a geophysicist. If you mention his name to a seismologist (earthquake specialist), the seismologist claims him as a fellow seismologist. He is co-author of a bold and controversial theory in climatology – on how the Ice Ages of the last million years have come and gone. But, if you ask Dr. Ewing what he is, his reply is simple: "I'm a physicist."

Part of each year, Dr. Ewing can be found at a wooded, cliff-hanging 100-acre estate on the west bank of the Hudson River – the home of Columbia University's Lamont Geological Observatory. He is the observatory's director. "Each of our programs," Dr. Ewing explains, "necessarily has problems of a specialized nature, and some of the projects may seem to be isolated studies. But in the long run they fit into a broad pattern, and all lead by different trails to the grand problem, which is the structure, composition, limiting conditions, and history of the planet that is our home in the universe."

But always, for a few months each year, the scientist can be found aboard the *Vema*, the observatory's trim ocean-going laboratory, or a newer research vessel, the *Robert D. Conrad*. Already, the vessels have cruised tens of thousands of miles.

Some of the *Vema's* discoveries read like chapters from a detective thriller. For many years, geologists believed that deep underwater canyons were the result of the Ice Ages. Supporters of this theory argued that, since the level of the oceans was then many fathoms lower than today, rivers gushing from the continents must have cut the gigantic canyons. If this theory were true, the canyons would disappear at a present ocean depth of 300 or 400 fathoms (1,800 to 2,400 feet). But, in tracing the Hudson River canyon, Dr. Ewing found that it did not disappear at that level. He charted the canyon for 200 miles, then turned back, feeling he had proved the theory was false.

There were some quiet mutterings in the opposing camp. Then supporters of the river-cut theory came out and said

that the Hudson River canyon was a freak. Dr. Ewing put out to sea again. This time, he traced several underwater canyons. Each one he explored continued *beyond* depths of more than 2,000 fathoms (12,000 feet). Result: The river-cut theory fell apart. Exactly what *does* cause the underwater canyons? Nobody knows. But Dr. Ewing is working on the problem.

Project Plans

His discoveries have helped him develop a new theory about the Ice Ages with Dr. William Donn, a professor of geology at Brooklyn College. According to the Ewing-Donn theory, the Ice Age cycle was started when the Earth's crust shifted. The shift moved the North Pole, then somewhere in the open North Pacific Ocean, to its present position in the Arctic Ocean. The South Pole also shifted to its present position in Antarctica from somewhere in the South Atlantic.

Are these projects enough to keep Dr. Ewing busy? By no means. For years he has wanted to punch a hole a mile or more into the ocean's floor, at least three miles below the surface. Why? To dig up mud from beneath the ocean. This *sediment*, brought up layer-by-layer, would provide a history of our planet's crust. (A similar sample taken on land would cover only a small span of geologic time.)

Another project Dr. Ewing is concerned with is the study of tidal movements in the Earth's crust. These Earth tides are produced by the gravitational pull of the sun and moon. They cause the Earth's crust near the equator to rise and fall as much as nine inches in a 12-hour period. Dr. Ewing and fellow scientists from the Lamont Geological Observatory have set up shop in an abandoned zinc mine in New Jersey. There, instruments have been installed that are so sensitive they can record a change of a small fraction of an inch in the Earth's crust between New York and Chicago. Goal of the project: to make a series of earth tide-tables similar to the familiar ocean tide-tables.

And yet another Ewing project: He is working on the development of a seismograph (earthquake-detector) to be landed upon the moon via Surveyor spacecraft. It will radio back its readings. "With a lunar seismograph," Dr. Ewing says, "we may expect to learn what kind of rock composes the main body of the moon, whether or not any of it is molten . . . details of the coating of dust and rubble, and very complete information about the distribution, size, and velocity of meteoric particles in space."

— Fred Brewer

The Vema, a floating oceanographic laboratory, snuggles against its Hudson River pier, soon to ply the sea in the cause of science.
New York Times photo

PROJECT POINTERS

Weather and Life

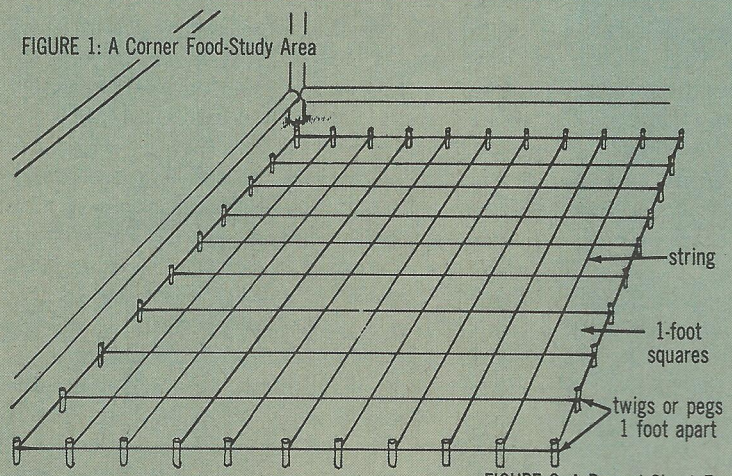


FIGURE 1: A Corner Food-Study Area

FIGURE 2: A Record Sheet For Food-Supply Study

Record Sheet No. 1

square	date of observation	number of seeds	temperature	soil condition	other comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

THE ARRIVAL of the winter months suggests many kinds of science projects having to do with the effect of weather change on both living and nonliving things. Weather factors that change from one season to the next include: average temperature and temperature extremes, amount of sunshine, amount and kind of precipitation (rain or snow), humidity, and wind direction and velocity. Some obvious effects of weather change on living things in a particular area include: loss of leaves by trees and the dying of other forms of plant life, changes in the kind and numbers of animal life present, and the appearance or disappearance of many kinds of insects. Some effects of weather change on nonliving things include changes in the rates of weathering of rock and erosion of soil. Less obvious, but of great importance, are the effects produced in an area by weather changes in far-distant areas. Thus, weather changes in the northern United States have an effect upon the bird population in the southern part of the country.

Many Problems, Many Projects

Why do changes in the various weather factors have such effects on living and nonliving things? Finding the answers to this question requires much research and experimentation. There are hundreds of related problems. Solutions depend upon the gathering of scientific evidence. The collection of evidence related to one of the possible problems can be a most fascinating and valuable science project.

For example, you could investigate the effect of weather change on food supply. The presence of animal life (birds, insects, squirrels, mice, fish, etc.) in an area depends upon the availability of food. Certain kinds of animals tend to eat certain kinds of food. For example, many birds eat only seeds, while others eat only insects.

To study the availability of seeds or insects in a small area, select a corner of your yard or a nearby field as far away from the street and buildings as possible. Do not use a corner that is too heavily shaded by trees or bushes. Divide the area you have selected into one-foot squares with twigs and string as shown in Figure 1. Try not to disturb the surface of the ground while you do this. It may be necessary to raise the strings if they become buried under leaves or snow. If the area you have selected is ten feet on a side, you will have 100 squares marked off by the strings.

Seed and Insect Census

Next, prepare a simple diagram of the area you have marked off. Number the squares on the diagram in a random manner from 1 to 100. These numbers correspond to those in the left-hand column of the blank observation record sheet shown in Figure 2.

Make observations once a day or once a week. A good time of the day to make observations is in the morning before you go to school. Each time you make an observation, use a different square.

To measure the availability of seeds, select the square to be observed. Use the edge of a piece of cardboard to scrape carefully the surface of the square into a box. If grass is present, use an old fork to collect the loose material from around the roots. Remove leaves, pieces of grass, and twigs from the box and dump the contents into a pan or bucket of water. After the dirt and stones have settled, examine the surface of the water for floating seeds. You will find a field handbook of plants that contains seed pictures helpful as you do this. Select one or two kinds of seeds which are easily recognized and count the number present. Record this number in the proper space on your observation sheet. Be sure you also record the temperature, condition of the ground (wet, moist, dry), and other important observations.

To measure the availability of insects, scratch the surface of the selected square several times with a twig or other object. Then, count the number of insects seen in the square during a five-minute observation period. Record this number in the proper space on the observation sheet.

Be sure to continue your series of observations even when snow covers the ground. You may have to wait for the snow scraped from the surface to melt in the pan of water before you count seeds. When counting insects, remove as much snow as possible from the square before scratching the surface of the ground.

Backyard Wildlife

At the same time that you are making your observations of seeds or insects, you might also make a record of the kinds of birds (or other animal life) you see each day in your yard.

After you have completed a series of observations, you can analyze and interpret the data you have collected. Be sure, when doing this, that you take into account all of the possible factors which could have influenced the data.

RICHARD HARBECK

ANSWERS TO BRAIN TEASERS (see page 25)

Again, the Prince

It does not matter how many socks are to be filled. If the Prince had completed one third of the work in seven days, he knew he would do twice as

much as that during the eighth day. This work on the eighth day would amount to two thirds of the job. This would complete it when combined with the one third he had done during the first seven days.

Double Crossings

Identify the men as A, B, and C and the corresponding wives as a, b, and c. On the first crossing, A and a cross, and A returns alone. Then A and B cross. A stays with his wife, and B returns. Next B and b cross, and b rows back alone to the starting point. Next b and c cross, and c returns alone. Finally, C and c cross together.

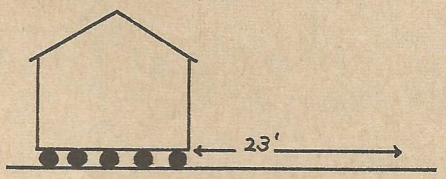
Canny Solution

Pour two gallons from the eight-gallon can into the two-gallon can and then empty the two-gallon can. Now tilt the two-gallon can and pour just enough oil into it to cover the bottom surface of the can and the lower lip of the top.

The two-gallon can will be exactly half full. Accordingly, one more gallon will have been removed from the eight-gallon can, leaving five gallons.

Editor's Choice

Every two feet that the house moves forward, the 12-inch rollers move only one foot forward on the ground and become one foot closer to the rear of



the house. Thus, as the house moves 23 feet, the rollers will move forward 11½ feet. Accordingly, the rear of the house will move 11½ feet farther than the rollers and will pass over three of them.

ANSWERS TO PUZZLE (see page 23)

	R	E	G	E	N	E	R	A	T	I	O	N
		B	O	Y		N		T	O	R	N	
P	M		B	E		Z		O	N	E		F	M
R	O	B				Y		M	E		B	L	E
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	I	N	O	C	U	L	A	T	I	O	N	S	

SENIOR SCIENCE 10.26.67

Scorekeeper (see page 22)

I. Climates of the Past
1.F; 2.T; 3.T; 4.F; 5.F; 6.F; *7.T; *8.T.

II. Climates of the Future
1F; 2.T; 3.F; 4.T; 5.T; 6.T; *7.T.

III. Currents and Climates
1.T; 2.F; 3.T; 4.T; 5.T; 6.F; *7.F.

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SCOREBOARD

How well have you read your *Senior Science*? Answers to questions with no asterisks may be gleaned directly from the articles. Answers to questions with an asterisk (*) require fusing the facts in the articles with those learned in the classroom or from your reading. Answers are in the SCOREKEEPER on page 21.

I. Climates of the Past

_____1. Ocean levels throughout the world are now dropping at about 4 inches per century.

_____2. Scientists have accumulated evidence to indicate that one of the greatest upsurges of the ocean level occurred about 6,000 years ago.

_____3. Coal deposits have been unearthed in the Arctic continent.

_____4. By using the "foraminfera thermometer," scientists have deduced that ocean temperatures have been rising for the past 32 million years.

_____5. There is evidence to indicate that the Earth has seen the last of its Ice Ages, and that there will probably be no Ice Age in the future.

_____6. The Earth is closest to the sun during our summer time.

_____*7. Only once in every 26,000 years is the North Star directly over the Earth's North Pole.

_____*8. If the carbon dioxide content of the Earth's atmosphere were reduced, the average surface temperature of the Earth would decrease.

II. Climates of the Future

_____1. In an area lacking in vegetation, rain water is quickly lost because the water rapidly sinks down into the ground.

_____2. Dark surfaces exposed to light become warmer than white surfaces, but dark surfaces radiate their heat faster than white ones.

_____3. Desert areas are characterized by the lack of motion of the air at the surface.

_____4. If water were supplied to the Sahara Desert, the rich soil that resulted could support a lush vegetation.

_____5. Rain can be produced by "seeding" large clouds with dry ice.

_____6. Dust domes forming around large cities may cut as much as a third of the normal sunlight.

_____*7. Silver iodide is effective in seeding clouds and producing rain because the silver iodide crystal strongly resembles an ice crystal in shape.

III. Currents and Climates

_____1. It requires more heat to raise 1 gram of water 1°C than it does to raise 1 gram of practically any other substance 1°C.

_____2. In the Northern Hemisphere, between latitudes 40° N and 60° N, the prevailing wind is toward the west.

_____3. Because of the Earth's rotation, a wind that blows from the north in the Northern Hemisphere will be deflected toward the west.

_____4. In the Northern Hemisphere, the direction of the rotation of the ocean currents is generally clockwise.

_____5. The warm currents that flow toward the equator from the poles are all on the east sides of the oceans.

_____6. Guano is mined in Chile.

_____*7. Bismarck, North Dakota, has a uniform temperature all year round because it is far from any large body of water.

Going Beyond

Of the total radiation that the sun emits, the Earth intercepts one part in two billion. Of the energy that strikes the upper atmosphere, 35 per cent is reflected by clouds back into space; 20 per cent is absorbed directly by the atmosphere, mostly in the denser lower layers where the chief absorbing gases, carbon dioxide and water vapor, are concentrated; and the remaining 45 per cent of the solar radiation reaches the surface of the Earth.

1. What portion of the total energy emitted by the sun actually arrives at the Earth's surface?

2. What becomes of the 45 per cent of the solar radiation that reaches the Earth's surface?

The energy of the sun comes to us in the form of radiation. There are ultraviolet rays, visible lights, and infrared rays. Carbon dioxide and water vapor are transparent to visible light but are opaque to infrared rays.

3. What becomes of the energy of the infrared rays when they are absorbed by the carbon dioxide and water vapor?

On striking the Earth, the visible light warms the Earth. The warmed Earth re-radiates the energy in the form of infrared rays.

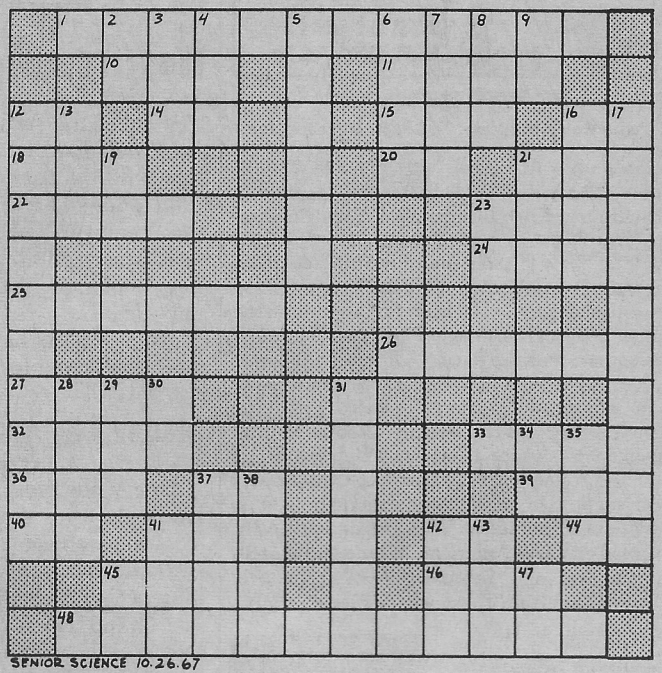
4. What becomes of the infrared rays re-radiated by the Earth?

Biological Lingo

By Cheri Sjolander, Grantsberg H. S., Grantsburg, Wis.

★ **Starred words refer to biological terms**

Students are invited to submit original crossword puzzles for publication in *Senior Science*. Each puzzle should be built around one topic in science, such as astronomy, astronautics, botany, geology, electronics, famous scientists, etc. Maximum of 50 words, of which at least 15 must be related to the theme. For each puzzle published we will pay $10. No entry will be considered unless it includes all of the following: symmetrical puzzle design and design with answers filled in, definitions, answers on separate sheets, and a statement by the student that the puzzle is original and his own work. **Puzzles must be symmetrical.** Keep a copy, as puzzles cannot be returned. Give name, home address, school, and grade. Address: Puzzle Editor, *Senior Science*, 50 West 44th Street, New York, N. Y. 10036. Answers to this puzzle are on page 21



ACROSS

* 1. Ability of organisms to regrow missing parts.
10. Older than an infant; younger than a man.
11. Ripped.
12. Afternoon.
14. To exist.
15. Single in number.
16. Frequency modulation *(abbr.)*.
18. To take away by force.
20. Myself.
21. Brotherhood of Locomotive Engineers *(abbr.)*.
22. To do as bidden.
23. That which causes a body to rise in temperature.
*24. Any plant of a group comprising nearly all seaweed.
*25. Tissues grouped together that perform a function *(pl.)*.
*26. A person having a congenital deficiency of pigment in the skin, hair, and eyes.
*27. Transparent disk through which light rays are directed to retina of the eye.
*32. Stem or central column of a plant.
33. Prefix meaning *half*.
36. To drink in small quantities.
37. Initials of one of Dickens' most famous boys.
39. Distress signal.
40. First book of the New Testament *(abbr.)*.
41. Parent Teachers' Association.
*42. Infectious disease caused by tubercle bacillus *(abbr.)*.
44. Matrimony *(Latin abbr.)*.
45. Child's bed.
46. A straight, slender stick.
*48. Vaccinations.

DOWN

2. Scrooge's Christian name *(abbr.)*.
3. Sailor.
* 4. I *(homonym)*.
* 5. A catalyst which brings about a chemical change in the digestion of foods.
* 6. Smallest particle of an element.
* 7. State of a body in which the animal functions are healthy and active.
8. Wrath.
9. Not off.
*12. Living substance found in all life.
13. Unruly group.
16. A country's banner.
17. Sum of the chemical processes of the body.
19. Same as No. 14 Across.
*21. One of the major Babylonian gods.
23. Exclamation.
28. Leave.
29. To pinch or bite.
30. Superintendent of schools *(abbr.)*.
*31. Transparent part of the coat of the eyeball, which admits light.
*34. Endocrine system *(abbr.)*.
35. Dad's wife.
*37. In the region of the ear.
38. Forbidden.
41. Professional *(abbr.)*.
42. Prefix meaning *three*.
43. Hoot at.
45. Cosine of the amplitude *(abbr.)*.
47. Down *(abbr.)*.

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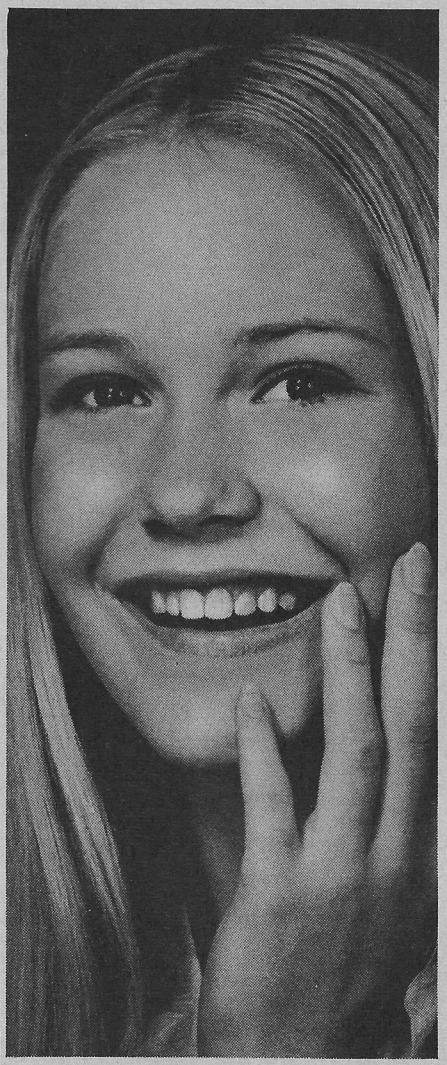

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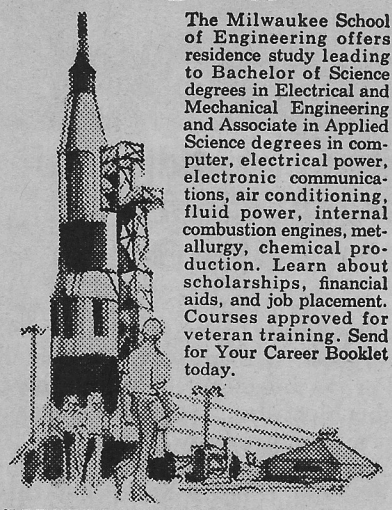

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DISC-USSIONS

THE BEST OF THE NEW LPs

BY ROY HEMMING
with Robin McBride, Ed Coach, Buzz Royden

Copland: A Lincoln Portrait—Carl Sandburg, Kostelanetz, New York Philharmonic [*CBS Special Service Records—91A-02007*]. CLASSICAL ALBUM OF THE WEEK. This is a reissue of a 1960 recording [originally Columbia MS6040]—and it's a most worthwhile reissue for both musical and historical reasons. The late Sandburg, of course, was the nation's foremost Lincolnian. And it was Kostelanetz who originally commissioned Copland to write this brief but stirring musical setting of some of Lincoln's speeches and letters, which Sandburg reads so eloquently. Overside, Kostelanetz conducts two other fine American works: William Schuman's *New England Triptych* (based on early American hymns and marching songs) and Samuel Barber's beautiful Intermezzo from the opera *Vanessa*. (R.H.)

The Kennedy Dream—Oliver Nelson Orchestra [*Impulse A9144*]. JAZZ ALBUM OF THE WEEK. As the first U.S. President who ever hosted a formal jazz concert in the White House, it is fitting that John F. Kennedy should be paid musical tribute in a jazz work. Whether or not Nelson's suite is really "jazz" may be a matter for debate (some may well feel it comes closer to jazz-oriented movie music), but it is an impressive and moving work on any terms. Seven of its eight sections begin with Kennedy's own voice in various quotations (on peace, civil rights, the arts, and Mrs. Kennedy) which Nelson then seeks to express or comment on musically. Like JFK, the music is spirited, earnest, contemporary, and frequently witty. (R.H.)

Oliver Nelson

Ian and Sylvia—Lovin' Sound [*MGM SE-4388*]. This husband and wife folk duo stretches out toward some new vistas on this effort. Most notable among them are "Windy Weather" and "National Hotel." Also present: a fine version of Tim Hardin's "Hang On to a Dream" and a nice-and-easy "Where Did All the Love Go?" Good sounds all. (R.M.)

State and College Songs [*Disneyland DQ 1293*]. This is the sort of budget-priced album that lends itself nicely to group singalongs during Big Game celebrations. The arrangements for big band and chorus of the songs of Cal, Georgia Tech, Michigan, and 12 others are spiritedly done. All but one, however, is limited to just one verse, and a few welcome reprises might have been made by trimming some of "guest cheerleader" Annette's hoked-up rah-rahs. (B.R.)

Science on TV

The 21st Century

(Sun., Oct. 29, 6:00 p.m. EST, CBS-TV)

A half-hour program on "Miracle of the Mind" will examine what is being done with the complexities of the human mind and what this will mean in the next century. The broadcast will deal with "smart pills," memory erasers, synthetic emotions, voluntary brainwaves, and whether we might be happier, smarter – or perhaps just manipulated – in the 21st century.

National Geographic Special

(Wed., Nov. 1, 7:30 p.m. EST, CBS-TV)

One of the most dangerous animals in North America – the giant grizzly bear – is the subject of this season's first *National Geographic* special. The hour-long program was filmed in Yellowstone and Grand Teton National Parks, where Drs. Frank and John Craighead have, for eight years, been carrying on a conservation study to save the grizzly from joining the dinosaur in extinction.

Grizzlies are now largely confined to national parks. Last summer, the giant beasts killed two people in Glacier National Park. They have long been one of the most ferocious of all animals, yet little is known about them.

The Craighead brothers will be shown demonstrating the intricacies of bear research during the special program. After they capture the animals in steel culvert sections, the Craigheads drug them temporarily so they can study them, and then tag each one for future identification. To some of them, they attach tiny radio transmitters which send out beeping signals up to 20 miles away.

The program will be narrated by Alexander Scourby.

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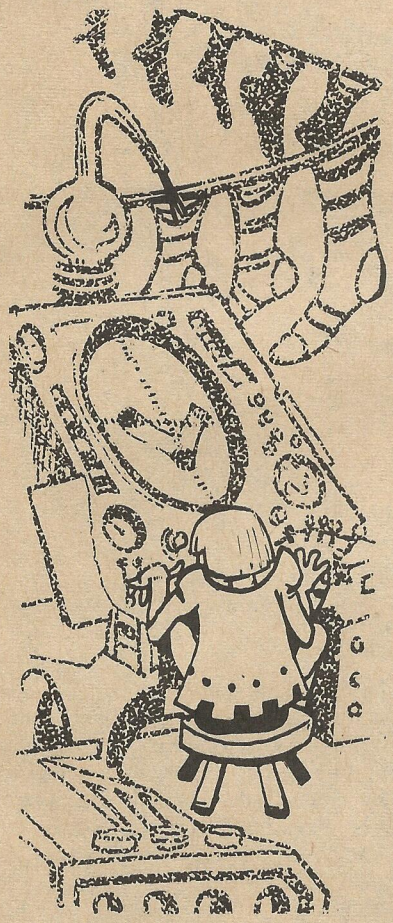
ANSWERS ON PAGE 21

brainteasers

Again, the Prince

"Each day," said the Wicked Witch to our Proud Prince, "you must fill argyle socks with worn-out transistor radio batteries. You are to continue doing this until all the socks are full.

"Moreover," the Wicked Witch continued, "your labors will become increasingly strenuous. Each day after the first, you must fill double the number of socks that you have so far filled. Thus, if you fill three socks the first day, you must fill six the second day, 18 the third day, and so on. Is that clear?



"Perfectly clear," replied the Prince.

"Come to think of it," said the Witch, "I'll excuse you from this tedious task on one condition. It will take you seven days to fill one third of the socks. If you can tell me in a twinkling how many days it will take you to do the whole job, I'll excuse you."

In half a twinkling our Proud Prince had the answer and was on his way to more princely pursuits.

What was his answer?

Stan Van Valkenburg
Midland. Mich.

Double Crossings

Three couples must cross a river,using a boat which will transport only two passengers. None of the men is willing to have his wife in the boat or on the far shore with another man or men unless he is also present. Further, each man is unwilling to leave his wife alone with another man at the starting point. Assuming that the women as well as the men can row the boat, how can the three couples cross the river?

Murphy Mason
Holy Spirit S.
Louisville, Ky.

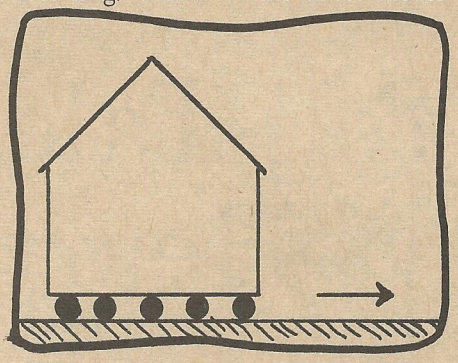
Canny Solution

Suppose you have an eight-gallon can full of oil and an empty two-gallon can. How can you remove exactly three gallons of oil from the eight-gallon container in order to have five gallons remaining?

Nick Hanson
Ingomar Jr. H.S.
Pittsburgh, Pa.

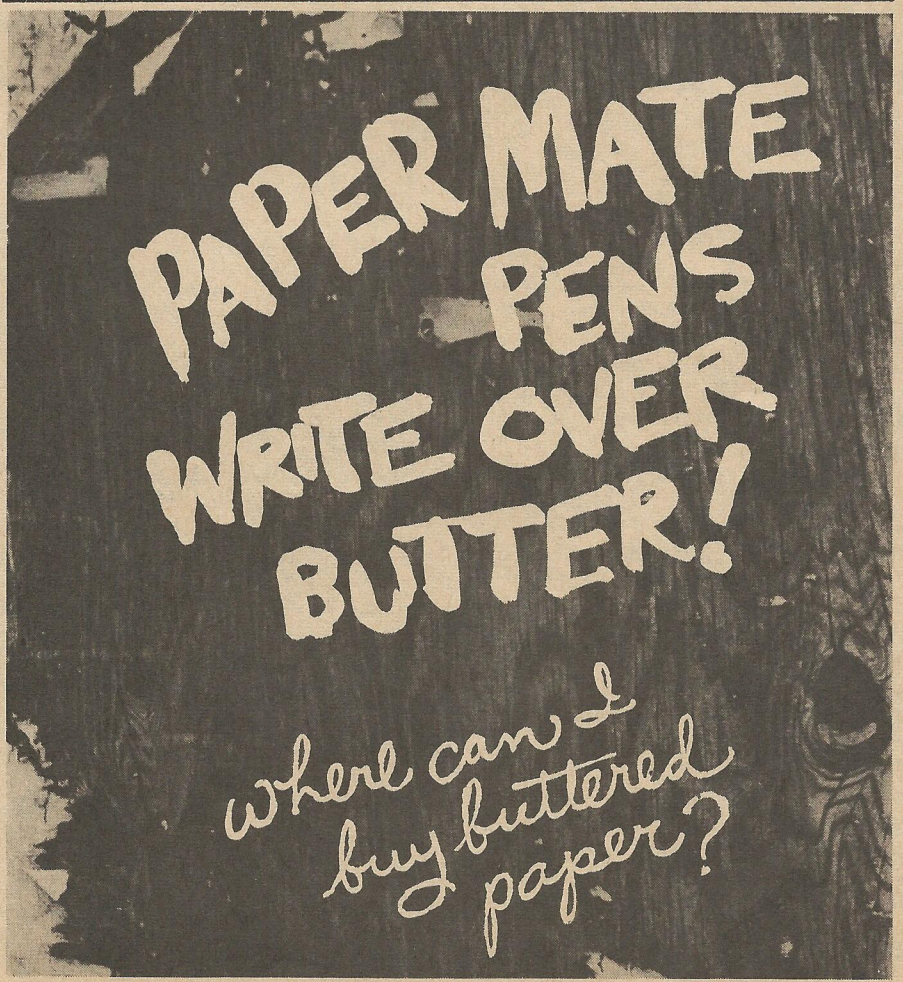
Editor's Choice

A house is to be moved a distance of 23 feet on rollers. The rollers are 12 inches in circumference. Five rollers are being used, placed at four-foot intervals under the house, which is 16 feet long. Whenever the house moves



off the rear roller, the roller is brought around and placed in front. How many times will a roller be moved from the rear of the house to the front during the course of moving the house 23 feet?

Do you have a favorite brain teaser? Send it to Senior Science, 50 West 44th St., New York, New York 10036. We will pay five dollars for each one published. Include the name of your school, home address, grade, and age. In case of duplicate submissions, choice will be made on the basis of presentation and clarity.



SPORTS

Tell-Tale "Heart"

BILL KOMAN may not be the greatest linebacker in the world. But he can do one thing as well as anyone in pro football – get his name into the papers. He's that rarity in sports – a fearless, straight-talking "pop-off." A spade-is-a-spade-is-a-spade to the St. Louis Cardinal linebacker, and he's ready to pop off at the drop of a reporter's pencil.

He frankly admits he's the most under-rated player in pro football, that he's afraid of nothing that breathes, and that nobody puts out more, has more guts, and has gotten more out of his God-given talent.

All of this would be funny – if it didn't happen to be true. I can vouch for this from personal experience. Back in the summer of 1955, I spent a couple of days in the Baltimore Colts' training camp, and I came away with two vivid memories.

First was the general manager's apology for a rookie quarterback's awful showing. "We picked him up from the sandlots," the G.M. explained. "We know he doesn't look like much, but he does have poise and we expect his throwing to come around."

"If he's a pro quarterback," I said, "I'm George Washington." Much to my surprise, it turned out that I was the father of our country. That rookie sad-sack happened to be Johnny Unitas!

The other incident occurred the next evening during a bull session with two rookie guards. The two boys could have been twins. Both were 6-1, solidly built 215-pounders who obviously weren't big enough or fast enough to play guard in the pros.

One of the rookies had already "cut" himself. "Gee," he said, "what kind of chance do I stand against all those veterans? They're so much bigger, faster, and more experienced."

The other rookie shook his head. His eyes glittered as he snarled, "I don't think they're so great. I'll take on any of them. This is a tough man's game and I'm as tough as anyone out there."

The astonishing difference in attitudes interested me. Here were two fellows of equal size and ability, but one had already given up while the other burned with confidence. I remember thinking that the second fellow had to be suffering from a big head or merely was whistling past a graveyard. He couldn't possibly have thought that at 215 pounds he was good enough to play the line for the Colts.

My impression turned out to be 100 per cent wrong. The fellow hadn't been giving me an exercise in boasting. He went on to prove that mental toughness can carry you all the way. He not only survived the final cut, but hung in there until he learned the trade of linebacker.

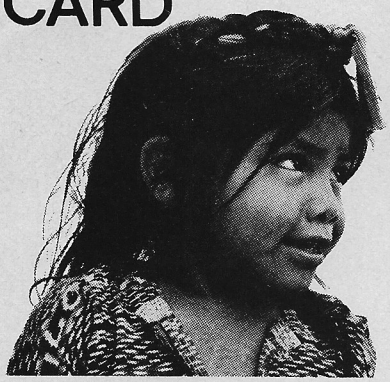
In short he was a real pro. You might defeat him physically once in a while, but never mentally. He'd stick in there until he beat you. And Bill Koman is still sticking in there after 12 years in the pros.

Coaches are always looking for the Komans – the fellows who come to play, who concede nothing, who make up for their physical shortcomings with desire and toughness. They usually produce twice as much as the more talented athletes who let themselves be pushed around, who wilt under pressure.

The Komans of the sport world are constantly proving that a bucketful of heart often can carry you farther than a bucketful of talent.

– HERMAN L. MASIN, *Sports Editor*

LET YOUR CARD



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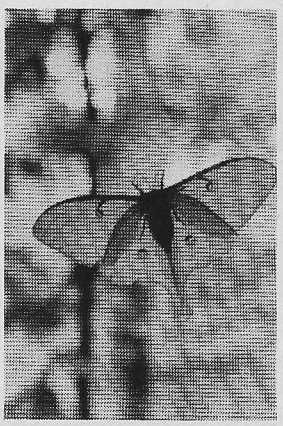

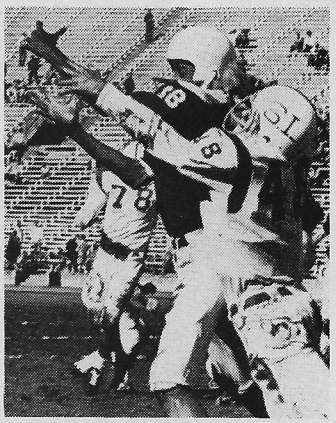

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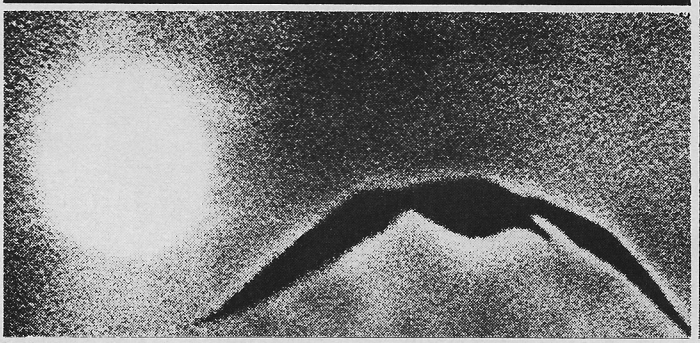

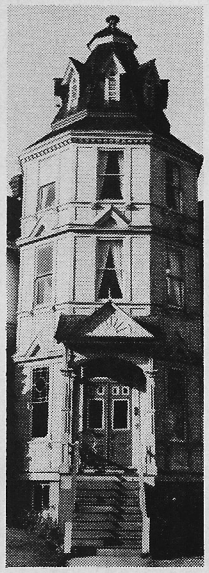

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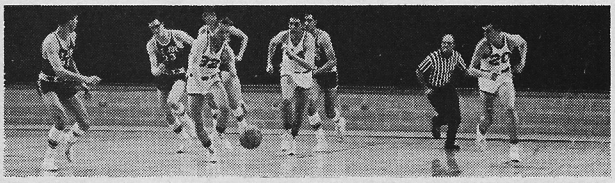

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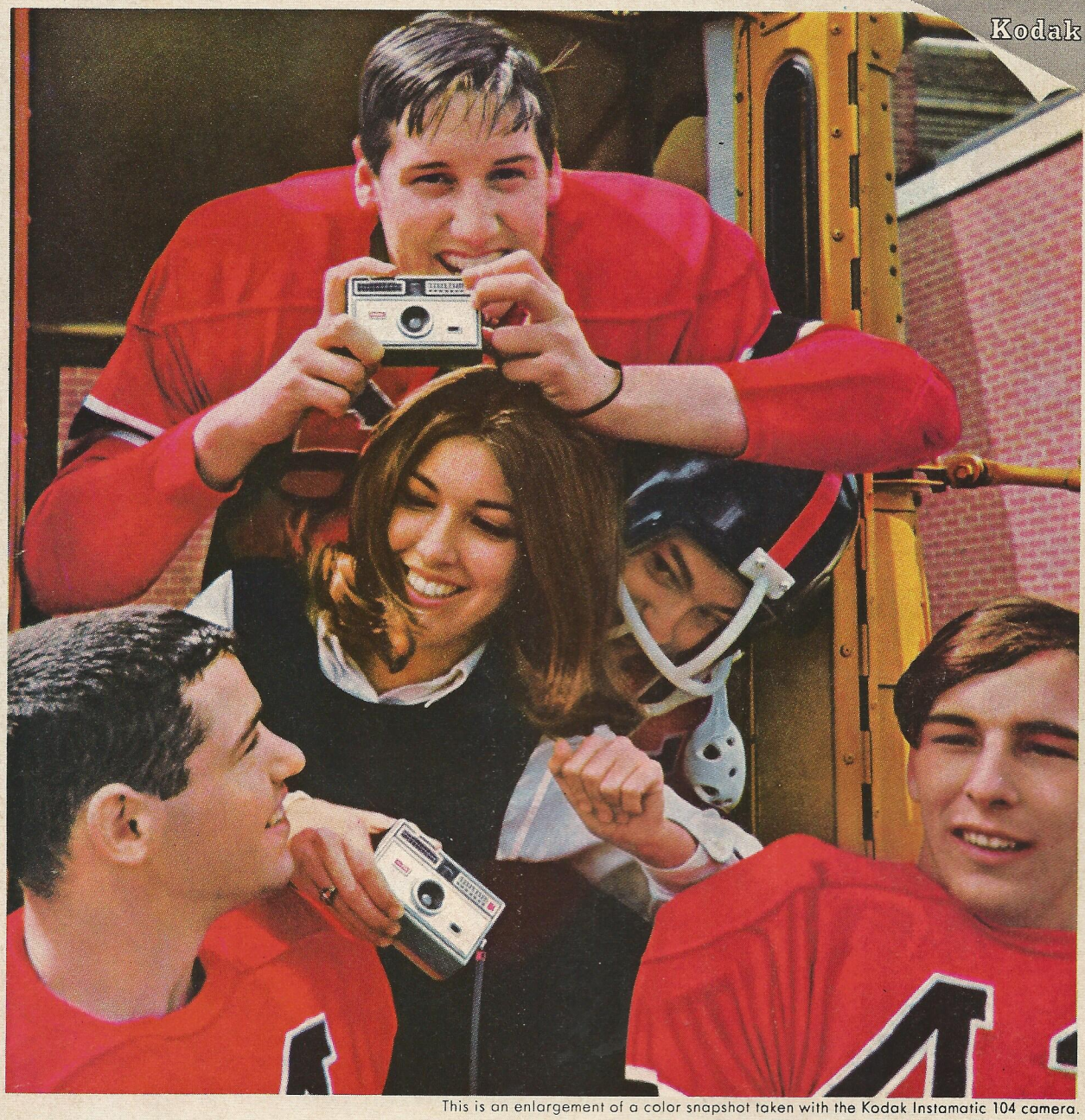

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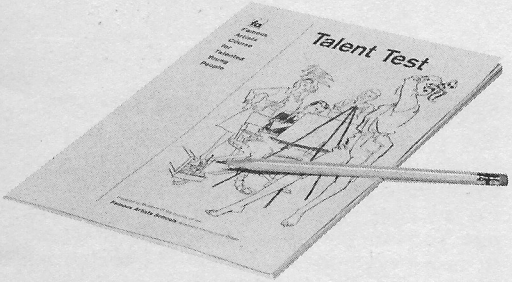

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